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THE SYSTEMATICS COMMUNITY

Compiled and Edited

by

STEPHEN R. EDWARDS
Executive Director

GEORGE M. DAVIS
President (1982-84)

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President (1984-85)

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THE SYSTEMATICS COMMUNITY

Prepared for

THE NATIONAL SCIENCE FOUNDATION
Division of Biotic Systems and Resources

by

STEPHEN R. EDWARDS
Executive Director

GEORGE M. DAVIS
President (1982-1984)

and

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The Systematics Community

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THE SYSTEMATICS COMMUNITY

SECTION 1: INTRODUCTION

This report provides the first interdisciplinary assessment of the systematics community in the United States. Data were compiled over a three year period (1981-1983) under a contract (BSR 81-12876) from the National Science Foundation (NSF) to the Association of Systematics Collections (ASC). The goal of this report is to provide "bench mark" data and an evaluation as well as an analysis of the status of the systematics community of the United States and its physical resources. The information provided may assist the National Science Foundation (Division of Biotic Systems and Resources) in establishing program goals and priorities. The systematics community will benefit in a similar manner by having data necessary to substantiate community needs and establish priorities for addressing these needs.

The information summarized in this report specifically covers the following aspects of the systematics community: 1) the extent, diversity, and needs for physical resources (i.e., collections, equipment, and facilities); 2) the demography of the community, including employment opportunities and college/university curricula in systematic biology; 3) the extent and diversity of financial resources available to the community; and 4) the personnel needs of the community.

Background

Between 1972 and 1979, scholarly societies representing various disciplines in systematic biology published the results of surveys of the collection resources available in their field to support research programs in systematics. The majority of these survey results were published between 1973 and 1976. Unfortunately, there was little or no coordination among the surveys. Therefore, the data are not generally comparable among disciplines and vary greatly in the extent of their coverage and depth of analysis.

America's Systematics Collections: A National Plan (Irwin et al., 1973: Association of Systematics Collections, 63 pages) provided recommendations to resolve problems affecting collections on an interinstitutional basis. The

the problems were developed by representatives of a broad spectrum of the sys- problems were reasonably well defined and the recommendations to respond to tematics community. Nevertheless, the problems affecting researchers in sys- tematics were not addressed directly, and the community still remains divided into discipline-oriented groups that only rarely interact in mutually bene- ficial ways.

Stuessy and Thomson, in an unpublished report to the NSF in 1980, entitled The Systematic Biology Program of the National Science Foundation: Recommenda- tions for Long-Term Planning, stated that "...periodic self evaluation is needed in order to make sure that the goals of the community of 'users' and the policies of the funding agency...[NSF]...not only coincide but are both correctly formulated and expressed."

Definition of these goals is critical to both the NSF and the systematics com- munity but is difficult because of the divided nature of the community in terms of disciplines and individual priorities. Subsequently, a proposal from Stuessy and Thomson was funded by the NSF and resulted in five long-range planning workshops. These workshops addressed general topics in systematics (basic systematic research, tropical biology, research trends, human resourc- es, and physical resources) and resulted in a published report entitled Trends, Priorities and Needs in Systematic Biology (Stuessy and Thomson, eds., 1981: Association of Systematics Collections, 51 pages).

Of particular relevance to this report were the workshops on physical re- sources and personnel in systematics. Participants in both of these workshops noted that data were not available to substantiate recommendations for action. Specifically, the participants in the workshop on physical resources recom- mended "...that...a report...[be prepared]...that would summarize the extent, distribution, nature, and condition of the physical resources of systematic biology...." Participants in the workshop on personnel resources recommended that "Data on professional systematists...[should]...be gathered...to discover the relevant age distribution, sex, minority status,...and taxonomic/geograph- ic limits of the interests of professional systematists."

The present study was undertaken to provide basic data needed to define the systematics community and establish realistic discipline-wide goals. The data

that have been compiled provide a demographic profile of the systematics community and document the extent, diversity, and availability of physical and financial resources in the community.

Flow of the Report

This report is presented in seven sections. The **INTRODUCTION** provides a statement of the goals of the project, a review of the background events that prompted the Association to undertake this project, and acknowledges the many contributions that have made this work possible.

Section 2, **METHODS**, summarizes the procedures followed in developing and circulating the questionnaires and compiling and summarizing the data presented in this report. It also summarizes procedures followed in reviewing financial resources available to the community.

Sections 3 through 6 present the results of the project activities. Each of these sections is preceded by a list of the "Principal Indicators" that serves to highlight the most significant points in that section. Section 3, **RESPONSE**, summarizes the response rates and provides an overview of characteristics of the respondents to the two principal national surveys (physical resources and individual demography) undertaken in this project. Data are summarized in Tables 1-11.

Sections 4 and 5, **PHYSICAL RESOURCES IN THE UNITED STATES** and **DEMOGRAPHY OF INDIVIDUAL RESEARCHERS**, discuss the data compiled from the respondents to the questions in the respective surveys. These data are presented in Tables 12-98, with accompanying text that describes the results and identifies particularly important trends evident in the responses to each question.

Section 6 analyzes **FINANCIAL ASPECTS OF THE SYSTEMATICS COMMUNITY**. Collection management costs, sources of funding for individual research, and grant support for research and facilities are reviewed. All questions in the two national surveys that pertain to income or expenses associated with collections or individual researchers are dealt with in this section. A review of federal support for systematic biology is provided with an emphasis on the

five grant programs in the Division of Biotic Systems and Resources of the NSF: Systematic Biology, Biological Research Resources, Population Biology and Physiological Ecology, Ecology, and Ecosystem Studies. Data pertinent to financial aspects of the systematics community are summarized in Tables 99-157.

Section 7 presents a SUMMARY of patterns that emerge from a comparison of the three principal data bases that were compiled on the systematics community: characteristics of physical resourses, demography of individual researchers, and financial aspects. Supplementary materials and documents pertinent to this report are provided in Appendices I-III.

Acknowledgements

A report like this could not have been prepared without the contributions and assistance of thousands of individuals. By providing data on their collections and themselves they have made this compilation possible. We extend our sincerest gratitude to them for their contributions and hope that this report provides a valuable service to them and to the balance of the community.

A number of individuals have made significant contributions that merit specific attribution. The initial project design was developed with the assistance of Drs. John Beaman (Michigan State University) and Tod Stuessy (Ohio State University). Questionnaires were developed with the assistance of Nancy Wert who, along with Julie Wimsatt and Patricia Bosch, made numerous contributions in entering and verifying the extensive data bases. George Pisani (University of Kansas) and Patricia Petrowski provided invaluable assistance by proofreading the data files against the original source questionnaires.

During the course of the project, personnel of the National Science Foundation were especially helpful in providing access to information and assistance in reviewing the draft copies of this report. We are particularly thankful to Drs. Frank Golley, John Brooks, Frank Harris and William Reider for the administrative support they provided while data were being recorded within the Foundation. The various program officers associated with the Systematic Biology program during the course of this contract have also been extremely help-

ful, namely Drs. John Beaman, Wayne Moss, Grady Webster, Harold Voris, James Edwards, Wallace LaBerge, and James Rodman. Dr. James Tyler, Director of the Biological Research Resources program, provided invaluable assistance and critically reviewed the manuscript.

Philip S. Humphrey (Museum of Natural History, University of Kansas), F. Wayne King (Florida State Museum, University of Florida), Graig D. Shaak (Florida State Museum, University of Florida), Marion Jenkins (Museum of Natural History, University of Kansas), Richard Schrock, and Janre Mullins critically read the manuscript, making numerous suggestions and comments that greatly enhanced the quality of the manuscript and significantly reduced the number of elusive typographical errors inherent in a manuscript of this dimension.

Finally, it is appropriate to acknowledge the support provided by the National Science Foundation without which this project would not have been possible. The material presented is based upon activities undertaken pursuant to Contract No. BSR 81-12876. While the Foundation provides awards for research and education in the sciences, the Association of Systematics Collections is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for such findings or their interpretation.

Any opinions, findings, conclusions, or recommendations expressed in this report are those of the authors, based on the data provided by respondents, and do not necessarily reflect the views of the National Science Foundation.

SECTION 2: METHODS

The objective of this project was to review and evaluate the status of the systematics community in the United States, specifically determining: 1) the extent, diversity, and availability of physical resources; 2) the number and diversity of active professionals in systematic biology (taking into account the employment market and the educational requirements for advanced degrees in systematic biology); and, 3) financial resources that are available to the community. The first two goals were addressed by preparing and circulating questionnaires. The third goal was met by interacting directly with federal funding agencies.

The data presented in this report are limited to factual reporting of the responses to individual questions in the two national surveys. In general, the data are summarized as the average, or modal, response to a particular question. Pooled averages, or modes, over all discipline-areas are presented when appropriate. Analysis of correlation of responses between two or more questions has not been performed due to time and financial limitations.

Further, the data presented are based on the assumption that nonrespondents to either the physical resources or the demographic survey represent a non-skewed or an unbiased subset of the general populations that have been sampled. Specifically, in the physical resources survey, large collections are represented in the survey on the same proportional basis as are smaller collections. This premise was substantiated by reviewing the log of respondents against the source mailing list.

We recognize that the results of this study are inherently biased due to quantitative and qualitative differences in the representation of collections and individuals in the source mailing lists. To a certain extent, this bias was corrected by the announcements published in the journals and newsletters serving the disciplines surveyed.

Throughout the course of this project, the Board of Directors of the Association of Systematics Collections and its Council on Systematic and Evolutionary Biology reviewed procedures and assured in the development of the questionnaire the broadest possible representation of the various disciplines.

Finally, throughout this report we use the term "discipline-area" to refer to those fields of study that concentrate on particular groups of related organisms, (e.g., mammalogy, ichthyology, entomology, botany, microbiology, etc.). The methods employed in surveying and compiling information in conjunction with each goal are described below.

Survey of Physical Resources

The targets of this survey were individual biological collections and associated personnel. By using the collection as the sampling unit, we were able to assess the physical resources (collections, equipment, and facilities), both available and needed, in systematic biology. The questionnaire (see Appendix I-A) used to compile the data on physical resources presented in this report was developed in consultation with NSF personnel and representatives of the different disciplines surveyed. The form was approved by the Office of Management and Budget (OMB) in November 1981. To limit the diversity of the analysis, 10 discipline-areas were defined (see Table 1).

The mailing list for distribution of this questionnaire was compiled from addresses available in ASC's computerized Registry for Taxonomic Resources and Services; citations in the discipline-oriented advisory committee reports (see Appendix II - SELECTED REFERENCES); and Index Herbariorum, (7th edition; Stafleu, et al., general eds.; Part 1, The Herbaria of the World, Compiled by Holmgren, et al., 1981, W. Junk, The Hague, 452 pages). In addition, an announcement inviting systematists to write for a copy of the appropriate survey, either physical resources or demographic, was published in 35 scholarly journals or newsletters.

As a result of our initial mailing and subsequent requests for questionnaires, a total of 3,869 forms was mailed to representatives of institutional collections between December 1981 and October 1982. Table 1 defines the discipline-areas surveyed and lists the number of questionnaires distributed in each discipline-area.

Data from returned surveys were reviewed for appropriateness of response to specific questions. Appropriate answers were coded and entered into ASC's

Jacquard computer. All computerized data were verified against source material. Responses to the different questions were then pooled and tabulated according to the discipline-areas defined in Table 1. Computer programs used during this process were either developed for specific data manipulations unique to this project or were available in the Jacquard software library.

TABLE 1: Discipline-areas surveyed for physical resources.

DISCIPLINE-AREA	DEFINITION	QUESTIONNAIRES MAILED NUMBER	PERCENT
Mammalogy	all modern mammals	479	12.38
Ornithology	all modern birds	352	9.10
Herpetology	all modern amphibians and reptiles	205	5.30
Ichthyology	all modern fishes	254	6.57
Vertebrate Fossils	all fossil vertebrates	146	3.77
Invertebrate Fossils	all fossil invertebrates	277	7.16
Invertebrates	all invertebrates except insects and arachnids	207	5.35
Entomology	all arachnids and insects	494	12.77
Botany	all higher plants, lower plants, and fossil plants	1,201	31.04
Microbiology	all protozoa, bacteria, and viruses	254	6.57
TOTAL		3,869	100.00

Demographic Survey of Individual Researchers

The focus of this survey was the individual members of those scholarly societies associated with the discipline-areas defined in the survey of physical resources (see Table 1). The mailing list for circulation of this survey was compiled from society membership lists provided by the NSF and societies affiliated with ASC. Approximately 35,000 citations were obtained in this manner. To the extent possible, duplicate, foreign, and institutional citations were removed and the balance entered into the computer. The resulting mailing list consisted of approximately 23,000 names. Nevertheless, variations in literal presentation of names on the list (i.e., S. R. Edwards, Stephen Edwards, Steve Edwards) and multiple addresses (e.g., home, office, etc.) resulted in a significant number of duplicate entries remaining in the list. Based on the number of people that told us about receiving duplicate questionnaires, we estimate that between 18,000 and 20,000 different people received

the demographic questionnaire. Table 2 lists the society membership lists used in this survey according to the discipline-areas defined in Table 1.

TABLE 2: Society membership lists used according to the discipline-areas surveyed.

DISCIPLINE-AREA	SOCIETIES
MAMMALOGY	American Society of Mammalogists
ORNITHOLOGY	American Ornithologists' Union
HERPETOLOGY	Society for the Study of Amphibians and Reptiles
ICHTHYOLOGY	American Society of Ichthyologists and Herpetologists
VERTEBRATE FOSSILS	Society for Vertebrate Paleontology
INVERTEBRATE FOSSILS	Paleontological Society
INVERTEBRATES	American Malacological Union American Society of Parasitologists Echinoderm Specialists of America Society of Protozoology Sponge Society
ENTOMOLOGY	American Arachnological Society Entomological Society of America (Partial)
BOTANY	American Bryological and Lichenological Society American Society of Plant Taxonomists Botanical Society of America Mycological Society of America Phycological Society of America
MICROBIOLOGY	American Society of Microbiologists (Partial)
OTHER	American Society of Zoologists Association of Systematics Collections Society of Systematic Zoology

The questionnaire used to compile data on individual researchers is presented in Appendix I-B. This form was approved by the OMB following review by NSF personnel and representatives from the community. Questionnaires were mailed to individuals between November 1982 and March 1983.

After responses to the survey were reviewed and coded, the data were entered into ASC's Jacquard computer. Certain questions (noted in Appendix I-B), determined to be inappropriate or ambiguous based on responses, were not incorporated into the analysis. Computerized data were verified against source questionnaires.

Answers to the various questions were tabulated in three successive blocks of data because of limits on the amount of data that could be manipulated in the computer at one time. Subsequently, these data were pooled on the basis of the 10 discipline-areas defined in Table 1, plus the category "Other," which was used to manage information from individuals who did not identify themselves as being associated with a particular discipline.

As in the survey of physical resources, computer programs were either developed for specific data manipulations unique to this project or were available in the Jacquard software library.

Financial Resources

Two distinct activities were undertaken to review the diversity and level of federal support available to the systematics community for research and facilities. First, detailed data were recorded on proposals submitted to programs in the Division of Biotic Systems and Resources (BSR) of the NSF: Systematic Biology (SB), Biological Research Resources (BRR), Population Biology and Physiological Ecology (PB), Ecology (EC), and Ecosystem Studies (ES). The proposal data base consisted of BSR proposals (awarded and declined) submitted and/or reviewed in fiscal years 1980 and 1981, as well as those fiscal years affected by increments of continuing awards made in 1980 and/or 1981. In the Systematic Biology and Biological Research Resources programs, data were recorded on all available proposals that were managed in those years. Random samples were used to obtain comparable data on proposals managed in Population Biology and Physiological Ecology, Ecology, and Ecosystem Studies. Programs in other divisions, such as Biological Oceanography, Stratigraphy and Paleontology, and International Programs, are known to support research in Systematic Biology; however, we did not have access to funding information in these programs and they are not reviewed in this report.

A copy of the form used to compile data on proposals and the definitions of the data categories used to record information on proposals are available (through December 1988) upon request from: Association of Systematics Collections, c/o Museum of Natural History, University of Kansas, Lawrence, Kansas 66045. The volume of data recorded and time limitations under the contract prevented the use of all data from this phase of the study in compiling this report (i.e., detailed budget information recorded on awarded and declined proposals was not used in developing this report).

All data recorded on proposals were entered into ASC's Jacquard computer and verified. Data analysis focused on the level of support available from BSR programs in the NSF from the following perspectives: 1) taxonomic diversity of the organisms studied; and 2) the "Types of Studies" supported, including the approach to the study. In addition, demographic data, including age, sex, year of highest degree, and institution of the applicant were recorded for each applicant. These data are compared with data compiled on the general population of systematists.

The second aspect of the review of federal support for research in systematic biology was directed toward determining the broader level of federal support in agencies other than the NSF. This was accomplished through a subcontract to Roger McManus who, in conjunction with Dr. Peter Escherich, contacted all federal agencies and independently assessed the availability of funds specifically for studies in "organismic biology." The term "organismic" was used rather than "systematic" because most agencies were unable to respond to inquiries based on usage of that word. However, project proposals identified as being "organismic" were determined to be either substantially systematics studies or studies that could be undertaken by a systematic biologist.

The results of this assessment were published as Sources of Federal Funding for Biological Research, 1983 (Escherich and McManus, Association of Systematics Collections, 83 pages) (Appendix III).

SECTION 3: RESPONSE

PRINCIPAL INDICATORS

1) Over 68% of the biological collections in the United States are maintained in academic institutions (Table 4A).

2) Freestanding institutions and academic museums maintain over 29% of the biological collections (Table 4A).

3) Seventy percent of the Vertebrate Fossil collections are maintained in freestanding institutions and academic museums (Tables 4B and 4C).

4) Of all of the collection resources, 69% are maintained by tax supported institutions; 55% are housed in colleges or universities (Table 4C).

5) One-fourth of the Entomology collections are maintained by individuals as personal collections (Table 4C).

6) The proportion of collection facilities, according to discipline-area (in descending order of percentage) are: Botany (26%), Entomology (15%), Mammalogy (11%), Ornithology (10%), Ichthyology (8%), Invertebrates (7%), Microbiology (6%), Herpetology (6%), Invertebrate Fossils (5%), and Vertebrate Fossils (5%) (Table 4B).

7) The proportion of systematic biologists in the community according to discipline-area (in order of descending percentage) are: Botany (28.6%), Entomology (19.6%), Invertebrates (15.1%), Herpetology (10.1%), Ichthyology (7.0%), Mammalogy (6.5%), Other (3.2%), Ornithology (3.0%), Vertebrate Fossils (2.9%), Microbiology (2.1%), and Invertebrate Fossils (1.8%) (Table 5).

8) Roughly 85% of the individual respondents are established professionals; 3.2% are post doctorals; and 10.2% are graduate students (Table 6).

9) The modal respondent was 41 years old at the time of the survey (Table 7).

10) Slightly over 87% of the respondents are male, 12.6% are female (Table 8).

11) Minority races constitute less than 5% of all individual respondents (Table 10).

Introduction

In the analysis that follows, the number of responses to a question has been converted, whenever possible, to a percentage based either on the total number of responses to the question or the number of respondents to the particular survey. The figures presented are designed to communicate the average, or modal, position in the community. When appropriate, basic descriptive statistics have been calculated and are presented in the referenced tables.

Survey of Physical Resources

A total of 3,869 collections was identified and their representatives were sent questionnaires. Table 3A summarizes the response rate according to discipline-area. Overall, a total of 1,404 returns resulted in a response rate of more than 36%. However, 262 (18.7%) of the respondents either provided no data (170, 12.1%) or pooled data on combinations of two or more collections (92, 6.6%) in the discipline-areas covered in this survey (Table 3B). Responses from those that provided pooled data are not used in this report; therefore, the basic "N" used to calculate proportional responses to particular questions was 1,142. Notably, a number of those that returned questionnaires without data indicated that they no longer maintained a collection or that the collection had been transferred to another facility. Of the 1,142 collections represented in this study, the number of collections per discipline-area varies from a low of 55 collections in Fossil Vertebrates to a high of 302 collections in Botany.

Slightly more than 68% of the biological collections in the United States are maintained in academic institutions, and over 55% are maintained within academic departments (Table 4A). Over 29% of the collections are maintained in either academic museums or freestanding institutions. When viewed on a discipline-area basis (Table 4B), the only exception to this trend is Vertebrate Fossils, in which 71% of the collections are in academic and freestanding institutions. In Microbiology, laboratories and biological surveys serve a role comparable to museums in other disciplines and maintain a significant percentage (27%) of the collection resources. Depending on the discipline-area, between 36% and 65% of the biological collections are maintained by tax supported state colleges or universities, based on a review of the different "institutional administrative types" for all discipline-areas (Table 4C).

TABLE 3A: Number of respondents, according to discipline-area.

SURVEY ACTIVITY	MAMMALOGY	ORNITHOLOGY	HERPETOLOGY	ICHTHYOLOGY	VERTEBRATE FOSSILS
Number mailed	479	352	205	254	146
Number returned	168	140	93	111	73
Percent response	35.1	39.8	45.4	43.7	50.0

TABLE 3A Continued: Number of respondents, according to discipline-area.

SURVEY ACTIVITY	INVERTEBRATE FOSSILS	INVERTEBRATES	ENTOMOLOGY	BOTANY	MICROBIOLOGY
Number mailed	277	207	494	1201	254
Number returned	77	101	195	354	92
Percent response	27.8	48.8	39.5	29.6	36.2

TABLE 3B: Categories of collections, according to respondents.

COLLECTIONS CATEGORIZED AS:	MAMMALOGY (N=168) N	%	ORNITHOLOGY (N=140) N	%	HERPETOLOGY (N=93) N	%	ICHTHYOLOGY (N=111) N	%	VERTEBRATE FOSSILS (N=73) N	%
Biology Collections	5	3.0	4	2.9	3	3.2	2	1.8	2	2.7
Zoology Collections	4	2.4	2	1.4	4	4.3	1	0.9	2	2.7
Vertebrate Collections	7	4.2	6	4.3	6	6.5	4	3.6	2	2.7
Higher Vert. Collections	5	3.0	4	2.9	3	3.2	3	2.7	4	5.5
Specific Collections	127	75.6	114	81.4	69	74.2	92	82.9	55	75.3
No data	20	12.0	10	7.0	8	9.3	9	7.4	8	11.0

TABLE 3B Continued: Categories of collections, according to respondents.

COLLECTIONS CATEGORIZED AS:	INVERTEBRATE FOSSILS (N=77) N	%	INVERTEBRATES (N=101) N	%	ENTOMOLOGY (N=195) N	%	BOTANY (N=354) N	%	MICROBIOLOGY (N=92) N	%
Biology Collections	2	2.6	3	3.0	2	1.0	2	0.6	0	0.0
Zoology Collections	2	2.6	3	3.0	0	0.0	#	#	#	#
Gen. Invert. Collections	0	0.0	2	2.0	0	0.0	#	#	#	#
Lower Vert. Collections	3	3.9	#	#	0	0.0	#	#	#	#
Specific Collections	62	80.5	75	74.3	176	90.0	302	85.3	70	76.1
No data	8	10.4	18	17.8	17	8.7	50	14.1	22	23.9

= Not applicable.

TABLE 4A : Total number of respondents by institutional administrative type.

INSTITUTIONAL ADMINISTRATIVE TYPE	RESPONDENTS N	%
Academic Department	638	55.9
Academic Museum	140	12.3
Freestanding Inst.	197	17.3
Lab/Bio Survey	101	8.8
Individuals	66	5.7
TOTAL	1142	100.0

TABLE 4B: Respondents pooled by institutional administrative type, according to discipline-area.

INSTITUTIONAL ADMINISTRATIVE TYPE	MAMMALOGY N	%	ORNITHOLOGY N	%	HERPETOLOGY N	%	ICHTHYOLOGY N	%	VERTEBRATE FOSSILS N	%
Academic Department	80	63.0	63	55.3	36	52.2	52	56.5	16	29.1
Academic Museum	20	15.7	21	18.4	16	23.2	16	17.4	17	30.9
Freestanding Inst.	20	15.8	22	19.3	15	21.7	12	13.1	22	40.0
Lab/Bio Survey	5	3.9	6	5.3	2	2.9	11	12.0	0	0.0
Individuals	2	1.6	2	1.8	0	0.0	1	1.1	0	0.0
TOTAL/AVG. %	127	11.1	114	10.0	69	6.0	92	8.1	55	4.8

TABLE 4B Continued: Respondents pooled by institutional administrative type, according to discipline-area.

INSTITUTIONAL ADMINISTRATIVE TYPE	INVERTEBRATE FOSSILS N	%	INVERTEBRATES N	%	ENTOMOLOGY N	%	BOTANY N	%	MICROBIOLOGY N	%
Academic Department	35	56.5	29	38.7	74	42.0	213	70.5	40	57.1
Academic Museum	12	19.4	11	14.7	10	5.7	17	5.6	0	0.0
Freestanding Inst.	13	21.0	17	22.7	28	15.9	45	14.9	3	4.3
Lab/Bio Survey	2	3.2	13	17.3	20	11.4	23	7.6	19	27.1
Individual	0	0.0	5	6.7	44	25.0	4	1.3	8	11.4
TOTAL/AVG. %	62	5.4	75	6.6	176	15.4	302	26.4	70	6.1

TABLE 4C: Respondents by institutional administrative type, according to discipline-area.

INSTITUTIONAL ADMINISTRATIVE TYPE	MAMMALOGY N	MAMMALOGY %	ORNITHOLOGY N	ORNITHOLOGY %	HERPETOLOGY N	HERPETOLOGY %	ICHTHYOLOGY N	ICHTHYOLOGY %	VERTEBRATE FOSSILS N	VERTEBRATE FOSSILS %
PUBLIC INSTITUTIONS:										
Federal:										
Academic Department	1	0.8	1	0.9	0	0.0	0	0.0	0	0.0
Academic Museum	2	1.6	1	0.9	0	0.0	1	1.1	1	1.8
Freestanding Inst.	3	2.4	1	0.9	1	1.5	1	1.1	2	3.6
Lab/Bio Survey	2	1.6	3	2.6	0	0.0	3	3.2	0	0.0
State:										
Academic Department	67	52.7	48	42.1	34	49.3	46	50.0	12	21.8
Academic Museum	10	7.8	12	10.5	11	15.9	11	12.0	12	21.8
Freestanding Inst.	7	5.5	4	3.5	2	2.8	3	3.2	8	14.6
Lab/Bio Survey	1	0.8	1	0.9	1	1.5	6	6.5	0	0.0
County:										
Academic Department	0	0.0	0	0.0	0	0.0	1	1.1	1	1.8
Academic Museum	1	0.8	0	0.0	0	0.0	1	1.1	0	0.0
Freestanding Inst.	1	0.8	1	0.9	1	1.5	0	0.0	2	3.6
Lab/Bio Survey	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Municipal:										
Academic Department	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Academic Museum	2	1.6	2	1.7	0	0.0	0	0.0	0	0.0
Freestanding Inst.	0	0.0	1	0.9	0	0.0	0	0.0	2	3.6
Lab/Bio Survey	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
PRIVATE INSTITUTIONS:										
Academic Department	12	9.5	14	12.3	2	2.8	5	5.4	3	5.5
Academic Museum	5	3.8	6	5.3	5	7.3	3	3.3	4	7.3
Freestanding Inst.	9	7.1	15	13.2	11	15.9	8	8.7	8	14.6
Lab/Bio Survey	2	1.6	2	1.7	1	1.5	2	2.2	0	0.0
INDIVIDUALS:	2	1.6	2	1.7	0	0.0	1	1.1	0	0.0
TOTAL	127	100.0	114	100.0	69	100.0	92	100.0	55	100.0

TABLE 4C Continued: Respondents by institutional administrative type, according to discipline-area.

INSTITUTIONAL ADMINISTRATIVE TYPE	INVERTEBRATE FOSSILS N	%	INVERTEBRATES N	%	ENTOMOLOGY N	%	BOTANY N	%	MICROBIOLOGY N	%
PUBLIC INSTITUTIONS:										
Federal										
Academic Department	0	0.0	0	0.0	2	1.1	13	4.2	5	7.2
Academic Museum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Freestanding Inst.	1	1.6	4	5.3	2	1.1	15	5.0	0	0.0
Lab/Bio Survey	1	1.6	3	4.0	8	4.6	13	4.2	6	8.6
State										
Academic Department	25	40.3	26	34.7	60	34.0	142	47.0	26	37.1
Academic Museum	9	14.5	8	10.7	4	2.3	8	2.6	0	0.0
Freestanding Inst.	4	6.5	4	5.3	4	2.3	6	2.0	2	2.9
Lab/Bio Survey	1	1.6	7	9.3	8	4.6	5	1.7	8	11.4
County										
Academic Department	1	1.6	0	0.0	0	0.0	2	0.7	1	1.4
Academic Museum	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
Freestanding Inst.	2	3.2	1	1.3	2	1.1	2	0.7	0	0.0
Lab/Bio Survey	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0
Municipal										
Academic Department	0	0.0	0	0.0	2	1.1	2	0.7	0	0.0
Academic Museum	1	1.6	1	1.3	0	0.0	2	0.7	0	0.0
Freestanding Inst.	1	1.6	0	0.0	0	0.0	0	0.0	0	0.0
Lab/Bio Survey	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
PRIVATE INSTITUTIONS:										
Academic Department	9	14.5	3	4.0	10	5.7	54	17.9	8	11.4
Academic Museum	2	3.2	2	2.7	6	3.4	6	2.0	0	0.0
Freestanding Inst.	5	8.2	8	10.7	20	11.4	22	7.3	1	1.4
Lab/Bio Survey	0	0.0	3	4.0	3	1.7	5	1.7	5	7.2
INDIVIDUALS:	0	0.0	5	6.7	44	25.0	4	1.3	8	11.4
TOTAL	62	100.0	75	100.0	176	100.0	302	100.0	70	100.0

Demographic Survey of Individual Researchers

One principal goal under the contract was to provide an estimate of the size or dimension of the systematics community. Previously there has been no comprehensive review of the systematics community, in part because there was no single professional organization of systematists which could provide the basis for an assessment. Traditionally, systematists have belonged to professional societies that were organized around the groups of organisms they studied rather than the field of systematics. In a few instances more than one society has been established around a particular discipline or group of organisms (e.g., American Society of Ichthyologists and Herpetologists, Herpetologists' League, and Society for the Study of Amphibians and Reptiles). Today, the memberships of these societies include behaviorists, ecologists, physiologists, and the like. As a result, systematists may represent a minority in these organizations. Nevertheless, these society membership lists proved to be the only means by which the questionnaires could be distributed.

A total of 23,000 questionnaires was distributed and approximately 2,850 were returned, which represents a response rate of approximately 12%. Taking into account duplicate mailings, approximately 18,000 to 20,000 different individuals received the questionnaire, yielding a response rate of 14% to 16%. However, even these figures are an underestimate of the response rate from systematists because the pooled society membership lists included nonsystematists. The combination of these factors leads to an estimate of the response from systematists as probably between 25% and 30%. Therefore, we estimate that there are between 8,000 and 10,000 systematists in the United States.

For purposes of this analysis, a respondent to the survey who provided data is considered a systematist. Of the surveys received, data from 2,555 individuals were tabulated to provide the basis for our assessment of individual researchers in the systematics community. Table 5 summarizes the number of respondents according to their specified disciplines or taxonomic focus, and how these disciplines were pooled according to the 11 discipline-areas used in the demographic study. The 295 questionnaires not included in the analysis were returned with no data or were received after data entry was suspended so that the responses to the questions could be tabulated.

The percentage distributions of respondents by discipline-area did not vary significantly among the three successive samples (see page 9). If the data presented in Table 5 are viewed as an estimate of the proportion of systematic biologists according to discipline-area (in order of descending percentage): 28.6% of the systematists are in Botany, 19.6% are in Entomology, 15.1% work with Invertebrates, 10.1% are in Herpetology, 7.0% are in Ichthyology, 6.5% are in Mammalogy, 3.2% are in "Other" areas of systematics, 3.0% are in Ornithology, 2.9% work with Vertebrate Fossils, 2.1% are in Microbiology, and 1.8% work with Invertebrate Fossils. When the different discipline-areas working on modern vertebrates are pooled, they represent 27% of the population, with nearly one-third of those in Herpetology.

About 85% of the respondents are established professionals, 3.2% hold post doctoral positions, and approximately 10% are graduate students (Table 6). The highest percentages of established professionals responding were in Microbiology (98.1%), Invertebrate Fossils (93.6%), and "Other" (91.5%). These relatively higher response rates from established professionals strongly correlate with relatively smaller percentages of responding graduate students in these discipline-areas (0.0%, 2.1%, and 1.2%, respectively).

The modal birth year of all respondents was 1941 (Table 7), so the modal respondent was 41 years old at the time of the survey. However, there tends to be considerable difference between the modal birth year and the average birth year as calculated for the different discipline-areas. In most cases, the average birth year was numerically smaller than the mode. The only discipline-area in which there was congruence between the modal and average birth year was in Herpetology (1942). In most discipline-areas the age curve is skewed by the relatively large number of respondents born in the 1940s. Also of note is the relatively wide range in birth year, ranging from 1892 to 1961.

Slightly over 87% of the respondents are male and 12.6% are female; the balance did not indicate their sex (Table 8). The highest percentages of female respondents are in "Other" (32.9%), Botany (17.1%), Microbiology (15.4%), Invertebrates (12.6%), Mammalogy (11.6%), and Vertebrate Fossils (11.1%). The lowest percentage of female respondents is in Ichthyology (5.1%).

More than 72% of the respondents are married (Table 9), with the highest percentage reported in Invertebrate Fossils (85.1%), and the lowest in Herpetology (66.0%).

Minority races constitute less than 5% of all respondents (Table 10). Of the minority races represented (69 respondents), 29 (42.0%) are of Mongoloid[1/] (except "American Indians") extraction. Overall, less than 0.2% of the respondents are Negroid. Forty-four respondents (1.7%) did not answer this question in the questionnaire.

Overall, 99% of the respondents are United States citizens (Table 11); 94.5% were born in the United States and 4.5% are naturalized. Twenty-five respondents (1.0%) did not answer this question in the questionnaire.

1/ Terminology provided by Office of Management and Budget when questionnaire was approved for circulation.

TABLE 5: Individual respondents according to their stipulated disciplines or taxonomic focus within the discipline-areas used in this study.

STIPULATED DISCIPLINE/ TAXONOMIC FOCUS	N	%	DISCIPLINE-AREA	N	%
Mammalogy	166	6.50	MAMMALOGY	166	6.50
Ornithology	78	3.05	ORNITHOLOGY	78	3.05
Herpetology	259	10.14	HERPETOLOGY	259	10.14
Ichthyology	180	7.05	ICHTHYOLOGY	180	7.05
Paleontology (Vertebrates)	30	1.17			
Paleontology (Mammals)	28	1.10			
Paleontology (Birds)	3	0.12	VERTEBRATE FOSSILS	74	2.90
Paleontology (Herps)	9	0.35			
Paleontology (Fish)	4	0.16			
General	103	4.03			
Protozoa	24	0.94			
Parasitology	57	2.23			
Nematoda	15	0.59			
Mollusca	91	3.56	INVERTEBRATES	385	15.07
Helminths	11	0.43			
Echinodermata	6	0.23			
Crustacea	19	0.74			
Carcinology	19	0.74			
Bryozoa	11	0.43			
Miscellaneous	29	1.14			
Invertebrate Paleontology	47	1.84	INVERTEBRATE FOSSILS	47	1.84
General	437	17.10			
Acarology	25	0.98	ENTOMOLOGY	501	19.61
Arachnology	33	1.29			
Araneology	6	0.23			
General	343	13.42			
Vascular Plants	94	3.68			
Tracheophytology	23	0.90			
Pteridology	16	0.63			
Phycology	76	2.97	BOTANY	730	28.57
Palynology	8	0.31			
Paleobotany	26	1.02			
Mycology	107	4.19			
Lichenology	14	0.55			
Miscellaneous	23	0.90			
Microbiology	53	2.07	MICROBIOLOGY	53	2.07
General Systematics	82	3.21	OTHER	82	3.20
TOTAL	2555	100.00		2555	100.00

TABLE 6: Professional status of respondents, by discipline-area.

DISCIPLINE-AREA	ESTABLISHED PROFESSIONAL N	%	POST DOCTORAL N	%	DOCTORAL STUDENTS N	%	MASTER'S STUDENTS N	%	OTHER N	%
MAMMALOGY (N=166)	136	81.93	7	4.22	15	9.04	5	3.01	3	1.81
ORNITHOLOGY (N=78)	70	89.74	1	1.28	6	7.69	0	0.00	1	1.28
HERPETOLOGY (N=259)	208	80.31	10	3.86	27	10.42	8	3.09	6	2.32
ICHTHYOLOGY (N=180)	150	83.33	9	5.00	15	8.33	5	2.78	1	0.56
VERTEBRATE FOSSILS (N=74)	64	86.49	1	1.35	5	6.76	1	1.35	3	4.05
INVERTEBRATE FOSSILS (N=47)	44	93.62	0	0.00	1	2.13	0	0.00	2	4.26
INVERTEBRATES (N=385)	332	86.23	14	3.64	28	7.27	7	1.82	4	1.04
ENTOMOLOGY (N=501)	411	82.20	15	3.00	56	11.20	9	1.80	10	2.00
BOTANY (N=730)	628	85.91	24	3.28	63	8.62	10	1.37	5	0.68
MICROBIOLOGY (N=53)	52	98.11	1	1.89	0	0.00	0	0.00	0	0.00
OTHER (N=82)	75	91.46	0	0.00	1	1.22	0	0.00	6	7.32
TOTAL/AVG. %	2170	84.93	82	3.21	217	8.49	45	1.76	41	1.60

TABLE 7: Birth year of respondents, by discipline-area.

DISCIPLINE-AREA	NUMBER RESPOND.	MODE/N	MEAN[1/]	STANDARD DEVIATION[1/]	RANGE
MAMMALOGY (N=166)	159	1950/10	1940	11	1909-1958
ORNITHOLOGY (N=78)	75	1942/ 8	1937	11	1903-1955
HERPETOLOGY (N=259)	253	1942/16	1942	10	1912-1959
ICHTHYOLOGY (N=180)	174	1941/11 1944/11 1945/11	1941	10	1915-1960
VERTEBRATE FOSSILS (N=74)	71	1950/ 7	1942	10	1910-1958
INVERTEBRATE FOSSILS (N=47)	47	1930/ 4 1939/ 4 1949/ 4	1936	13	1903-1955
INVERTEBRATES (N=385)	369	1944/20	1938	12	1892-1957
ENTOMOLOGY (N=501)	490	1947/23	1938	13	1897-1960
BOTANY (N=730)	703	1941/33	1938	12	1892-1961
MICROBIOLOGY (N=53)	53	1927/ 4 1934/ 4 1935/ 4 1938/ 4	1935	8	1921-1953
OTHER (N=82)	79	1936/ 6 1947/ 6	1937	11	1905-1957
TOTAL/MODE/RANGE	2473	1941/44	--	--	1892-1961

[1/]Rounded to nearest year.

TABLE 8: Sex of respondents, by discipline-area (percentages based on number of respondents to question).*

DISCIPLINE-AREA	NUMBER RESPOND.	MALE N	MALE %	FEMALE N	FEMALE %
MAMMALOGY (N=166)	164	145	88.41	19	11.59
ORNITHOLOGY (N=78)	76	69	90.79	7	9.21
HERPETOLOGY (N=259)	257	237	92.22	20	7.78
ICHTHYOLOGY (N=180)	177	168	94.92	9	5.08
VERTEBRATE FOSSILS (N=74)	72	64	88.89	8	11.11
INVERTEBRATE FOSSILS (N=47)	47	43	91.49	4	8.51
INVERTEBRATES (N=385)	373	326	87.40	47	12.60
ENTOMOLOGY (N=501)	491	444	90.43	47	9.57
BOTANY (N=730)	703	583	82.93	120	17.07
MICROBIOLOGY (N=53)	52	44	84.62	8	15.38
OTHER (N=82)	79	53	67.09	26	32.91
TOTAL/AVG. %	2491	2176	87.35	315	12.65

*Not all respondents to the survey indicated their sex.

TABLE 9: Marital status of respondents, according to discipline-area.

DISCIPLINE-AREA	MARRIED N	MARRIED %
MAMMALOGY (N=166)	123	75.00
ORNITHOLOGY (N=78)	58	74.36
HERPETOLOGY (N=259)	171	66.02
ICHTHYOLOGY (N=180)	132	73.33
VERTEBRATE FOSSILS (N=74)	53	71.62
INVERTEBRATE FOSSILS (N=47)	40	85.11
INVERTEBRATES (N=385)	280	72.73
ENTOMOLOGY (N=501)	373	74.75
BOTANY (N=730)	512	70.14
MICROBIOLOGY (N=53)	44	83.02
OTHER (N=82)	62	75.61
TOTAL/PERCENT (N=2555)	1848	72.33

TABLE 10: Racial distribution in the systematics community, by discipline-area.

DISCIPLINE-AREA	CAUCASOID N	CAUCASOID %	NEGROID N	NEGROID %	MONGOLOID N	MONGOLOID %	AMERICAN INDIAN N	AMERICAN INDIAN %	AUSTRALOID N	AUSTRALOID %	OTHER N	OTHER %
MAMMALOGY (N=166)	162	97.59	0	0.00	1	0.60	0	0.00	0	0.00	1	0.60
ORNITHOLOGY (N=78)	76	97.44	0	0.00	1	1.28	0	0.00	0	0.00	0	0.00
HERPETOLOGY (N=259)	251	96.91	0	0.00	1	0.39	1	0.39	0	0.00	6	2.32
ICHTHYOLOGY (N=180)	171	95.00	0	0.00	4	2.22	1	0.56	0	0.00	1	0.56
VERTEBRATE FOSSILS (N=74)	71	95.95	0	0.00	0	0.00	0	0.00	0	0.00	1	1.35
INVERTEBRATE FOSSILS (N=47)	46	97.87	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
INVERTEBRATES (N=385)	371	96.36	0	0.00	2	0.52	0	0.00	0	0.00	2	0.52
ENTOMOLOGY (N=501)	475	94.81	2	0.40	10	2.00	3	0.60	1	0.20	7	1.40
BOTANY (N=730)	694	95.07	1	0.14	8	1.10	1	0.14	0	0.00	9	1.23
MICROBIOLOGY (N=53)	48	90.57	1	1.89	1	1.89	1	1.89	0	0.00	1	1.89
OTHER (N=82)	77	93.90	0	0.00	1	1.22	0	0.00	0	0.00	0	0.00
TOTAL/PERCENT (N=2555)	2442	95.58	4	0.16	29	1.14	7	0.27	1	0.04	28	1.10

TABLE 11: Respondents as U.S. citizens, by birth or naturalization, according to discipline-area.

DISCIPLINE-AREA	U.S. CITIZEN BY BIRTH N	U.S. CITIZEN BY BIRTH %	NATURALIZED U.S. CITIZEN N	NATURALIZED U.S. CITIZEN %
MAMMALOGY (N=166)	158	95.18	8	4.82
ORNITHOLOGY (N=78)	74	94.87	1	1.28
HERPETOLOGY (N=259)	250	96.53	4	1.54
ICHTHYOLOGY (N=180)	172	95.56	8	4.44
VERTEBRATE FOSSILS (N=74)	67	90.54	3	4.05
INVERTEBRATE FOSSILS (N=47)	45	95.74	2	4.26
INVERTEBRATES (N=385)	365	94.81	19	4.94
ENTOMOLOGY (N=501)	476	95.01	25	5.00
BOTANY (N=730)	685	93.84	33	4.53
MICROBIOLOGY (N=53)	46	86.79	7	13.21
OTHER (N=82)	76	92.68	6	7.32
TOTAL/PERCENT (N=2555)	2414	94.48	116	4.54

SECTION 4: PHYSICAL RESOURCES IN THE UNITED STATES

PRINCIPAL INDICATORS

1) 191,000,000 specimen units are reported from 1,080 of the 1,142 collections tabulated in this report. Extrapolating from the 3,869 collections identified in preparing for the survey, biological collections in the United States could contain over 680,000,000 specimens (Table 12).

2) Between 48% and 86% of the collections in each discipline-area (except Microbiology, 43%) maintain a diverse array of supplemental collections designed to enhance the research value of the principal systematics collection (Table 15).

3) Computers are used to manage specimen-related data in 21% of the facilities surveyed, with an average of 40% of the specimen-related data in these collections accessible by computer (Table 16).

4) Each discipline-area uses different methods to relate specimens with associated data (i.e., catalogues, collection organization, specimen labeling conventions and procedures, specimen preparation requirements) (Tables 16, 17, and 18).

5) Of the 191,000,000 reported specimens, 64% (122,000,000) are catalogued (Table 19A); Invertebrate Fossil and Vertebrate Fossil collections have the largest percentages of uncatalogued specimens (85% and 78%, respectively) (Table 20).

6) An average of 3,230 square feet is required for specimen storage, management, and research associated with a systematics collection, of which an average of 52% is used for specimen storage (Table 21).

7) Protection against hazards that can reduce the usefulness of specimens, or ultimately destroy these collection resources, needs more study. However, 38% of the collections have no fire protection; 42%, no water damage protection; 17%, no protection against pests; 50%, no temperature control; 64%, no humidity control; and 22%, no protection against theft or vandalism (Table 22).

8) Forty-five percent of the respondents indicated they have a library associated with their collection; 62.6% indicated they have access to a centralized institutional library that has holdings pertinent to their discipline (Tables 24A and 24B).

9) When the total number of individuals associated with each collection (Table 25A) is adjusted according to a percentage of the Full Time Equivalent (FTE) personnel devoted to curating the collection, each collection is in effect curated by one-half a curator in the United States (Table 27A).

10) Volunteers represent 16.2% of the work force maintaining collections; undergraduate and graduate students comprise an additional 25.1% of the work force (Table 25B).

11) A total of 24,400,000 specimen-units was added to 1,007 collections between 1976 and 1981, representing an annual growth rate of 3% (Table 28). Twenty-six percent of the specimen-units acquired in 1980 were the result of grant supported research activities (Table 29).

12) Fifty percent of the responding collections require a total of 400,000 sq. ft. of additional collection storage space over the next five years (Table 32).

13) Systematics collection facilities provide an extensive array of services to the broader research community in the biological sciences and to the public. For the most part these services are provided as a "professional courtesy" to other professionals in the biological community; however, fee schedules have been developed in a number of institutions/collections for services provided to commercial enterprises or government agencies (Tables 33-47).

14) According to respondents, priorities for additional support to optimize use of their collections are: more personnel, specifically professional curators (first priority), technical staff (second priority), and additional storage space (third priority) (Table 48).

15) Regarding physical resources, Microbiology invariably is an exception to the trends reflected in the other discipline-areas (Tables 12-48).

Specimen Management in Collections

Of the 1,142 collections represented in this study, 1,080 (95%) reported having slightly more than 191,000,000 specimen-units (Table 12). The average number of specimen-units per responding collection varies enormously and may be correlated with the number and diversity of taxonomic groups associated with the discipline-area. The data for Microbiology are inconsistent with other collections in this regard, averaging only 3,110 specimen-units per collection while representing a very large and diverse number of taxonomic groups.

The largest collections (based on average number of specimen-units) are found in Entomology (654,622), Invertebrate Fossils (284,281), Invertebrates (234,579), and Botany (115,383). The smallest collections (excluding Microbiology) are in Ornithology (33,661) and Mammalogy (19,425).

Twenty-five percent of the respondent collections maintain holotype or paratype specimens (Table 13). Other kinds of type specimens maintained (with

average percent of collections maintaining them) are: isotypes (9%), lectotypes (5%), neotypes (4%), syntypes (7%), and paralectotypes (3%).

The total number of type specimens in respondent collections is reported at 452,669 (Table 14) or 2% of the total number of specimen units reported. The greatest numbers of types are held in Entomology collections (262,517 specimens), Invertebrate Fossils (49,853 specimens), and Invertebrates (42,067 specimens). The least numbers of types are held in collections of Microbiology (4,007), Mammalogy (5,107), and Vertebrate Fossils (5,876).

In addition to collections of biological specimens, many institutions maintain supplemental or ancillary collections that also support the research activities associated with the collections (Table 15). Yet the terms "supplemental" and "ancillary" are somewhat confusing. In some disciplines the principal collection is maintained in a manner that would constitute a "supplemental" or "ancillary" collection in another discipline (e.g., alcoholic specimens represent the principal collection in herpetology or ichthyology but are clearly "supplemental" in botany). Though the number of different kinds of supplemental collections varies by more than 15 categories according to discipline-area due to the particular needs of each, some commonalities nevertheless occur.

In collections of modern vertebrates, the three most common supplemental collections are dry skeletal material, alcoholic specimens, and original field notes. In Vertebrate Fossils and Invertebrate Fossils, the two supplemental collections most likely to occur are original field notes and photographic prints.1/ As might be expected, the three ancillary collections most likely to occur in conjunction with Invertebrates and Entomology are alcoholic specimens, 35mm slides, and original field notes. Ancillary collections in Botany are most likely to be 35mm slides, original field notes, and photographic prints. In Microbiology, ancillary collections are most likely to be photographic collections (35mm slides or prints). In future studies it will be important to determine the actual size and contents of at least the major categories of supplemental collections. Overall, the most important existing supplemental collections are original field notes.

1/ Editors' note: While casts of original specimens may in fact be the most common supplemental collection in Vertebrate Fossils, this option was not available to respondents to the questionnaire.

While there is common need across disciplines to associate field data with specimens, virtually each discipline has developed a distinctive regimen to accomplish this. Procedures vary, from the recording of all specimen data on a label directly associated with the specimens in the collection to the use of individual specimen or lot numbers and the recording of pertinent data in a catalogue that is accessed by the specimen number.

The specimen/data interface problem can be significantly reduced through the use of computers. Disciplines have adopted computer technology to manage specimen-related information to varying extents, but the trend is toward computerization. On the average, 21% of the collections reported using computers, ranging from a low of 11% in Entomology to a high of 35% in Invertebrates (Table 16). Of those collections using computers, an average of 40% of their specimen-records are computerized.

Even the unit catalogued varies by discipline-area (Table 17). Two categories are used by the majority of collections, individual specimens or species/locality lots. Specimens are catalogued and numbered individually in Mammalogy, Ornithology, Herpetology, Vertebrate Fossils (except microfossils), Invertebrate Fossils, and Entomology. Species/locality lots are generally used in Ichthyology and Invertebrates. Botany and Microbiology are the exceptions, using specimen sheets and cultures, respectively.

Catalogues are maintained in a variety of ways (Table 18), the most common being numeric, taxonomic, and geographic indices. The numeric cataloguing system is the prime method in Mammalogy, Ornithology, Herpetology, Ichthyology, Vertebrate Fossils, and Invertebrate Fossils. Invertebrates, Entomology, Botany, and Microbiology rely primarily on taxonomic catalogues.

Those specimens which are catalogued may be of greatest use to the research community. Of the 191,000,000 specimen-units reported (Table 12), approximately 122,000,000 (64%) are catalogued (Table 19A). When the number of uncatalogued specimen-units is expressed as a percent of the total specimen-unit holdings in each discipline-area (Table 20), the percent of uncatalogued specimens varies considerably (in descending order): Invertebrate Fossils (84%), Vertebrate Fossils (78%), Ichthyology (46%), Entomology (39%), Invertebrates (15%), Botany (14%), Herpetology (14%), Ornithology (6%), Microbiology (6%), and Mammalogy (6%).

TABLE 12: Total number of specimen-units in collections, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE	TOTAL SPECIMEN-UNITS	AVERAGE	STANDARD DEVIATION
MAMMALOGY (N=127)	3	2,408,729	19,425.23	60,434.02
ORNITHOLOGY (N=114)	4	3,702,717	33,661.06	103,429.24
HERPETOLOGY (N=69)	0	3,201,075	46,392.39	93,024.65
ICHTHYOLOGY (N=92)	5	8,037,913	92,389.80	507,237.54
VERTEBRATE FOSSILS (N=55)	2	4,399,525	83,009.91	418,298.32
INVERTEBRATE FOSSILS (N=62)	5	16,204,066	284,281.86	727,029.99
INVERTEBRATES (N=75)	5	16,420,533	234,579.04	1,200,377.46
ENTOMOLOGY (N=176)	18	103,430,364	654,622.56	2,077,122.69
BOTANY (N=302)	16	32,999,745	115,383.72	444,286.14
MICROBIOLOGY (N=70)	4	205,271	3,110.17	6,370.65
TOTAL	62	191,009,938	---	---

TABLE 13: Number of collections maintaining different kinds of type specimens, according to discipline-area.

KINDS OF TYPES	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Holotypes	21	19	22	15	34
Isotypes	0	0	0	0	0
Lectotypes	2	1	4	4	3
Neotypes	3	0	4	6	4
Paralectotypes	2	2	3	3	0
Paratypes	12	9	20	34	17
Syntypes	2	5	5	7	5
TOTAL	42	36	58	69	63

TABLE 13 Continued: Number of collections maintaining different kinds of type specimens, according to discipline-area.

KINDS OF TYPES	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Holotypes	20	21	54	78	5
Isotypes	1	1	3	96	3
Lectotypes	6	8	10	16	1
Neotypes	3	7	7	11	6
Paralectotypes	5	5	9	1	0
Paratypes	15	32	112	37	2
Syntypes	11	7	17	18	0
TOTAL	61	81	212	257	17

TABLE 14: Number of different kinds of type specimens in collections, according to discipline-area.

KINDS OF TYPES	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Holotypes	4,420	8,751	5,138	1,433	4,611
Isotypes	0	0	0	0	0
Lectotypes	5	1	12	49	8
Neotypes	10	0	21	12	4
Paralectotypes	9	16	45	204	0
Paratypes	595	2,195	13,709	10,020	1,041
Syntypes	68	32	1,431	589	212
TOTAL	5,107	10,995	20,356	12,307	5,876

TABLE 14 Continued: Number of different kinds of type specimens in collections, according to discipline-area.

KINDS OF TYPES	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Holotypes	12,780	18,461	63,372	14,723	512
Isotypes	8	20	2,530	19,315	117
Lectotypes	277	531	869	169	19
Neotypes	10	122	63	2,277	3,354
Paralectotypes	306	895	646	10	0
Paratypes	25,700	17,572	193,572	1,769	5
Syntypes	10,772	4,466	1,465	1,321	0
TOTAL	49,853	42,067	262,517	39,584	4,007

TABLE 15: Types of supplemental collections maintained by respondents in conjunction with primary collection, according to discipline-area.

TYPES OF SUPPLEMENTAL COLLECTIONS	MAMMALOGY (N=127)		ORNITHOLOGY (N=114)		HERPETOLOGY (N=68)		ICHTHYOLOGY (N=92)		VERTEBRATE FOSSILS (N=55)	
	N	%	N	%	N	%	N	%	N	%
Alcoholic Specimens	74	58.3	48	42.1	37	53.6	55	59.8	5	9.1
Audiospectrographs	3	2.4	6	5.3	4	5.8	2	2.2	0	0.0
Chromosome Squashes	19	15.0	1	0.9	11	15.9	6	6.5	0	0.0
Cleared & Stained Skeletons	23	18.1	7	6.1	27	39.1	48	52.2	1	1.8
Drawings	10	7.9	13	11.4	6	8.7	27	29.3	13	23.6
Dry Skeletal Material	89	70.1	69	60.5	49	71.0	52	56.5	27	49.1
Frozen Tissues	8	6.3	2	1.8	7	10.1	5	5.4	0	0.0
Histological Preparations	10	7.9	4	3.5	11	15.9	15	16.3	1	1.8
Motion Pictures	10	7.9	22	19.3	2	2.9	6	6.5	7	12.7
Original Field Notes	67	52.8	49	43.0	33	47.8	52	56.5	36	65.5
Photographic Prints	21	16.5	25	21.9	10	14.5	28	30.4	26	47.3
Radiographs	4	3.1	0	0.0	5	7.2	22	23.9	4	7.3
Recordings	9	7.1	22	19.3	9	13.0	2	2.2	0	0.0
Slides (35mm)	40	31.5	46	40.4	32	46.4	39	42.4	19	34.5
X-Rays	7	5.5	1	0.9	6	8.7	23	25.0	5	9.1
Other[1]/	13	10.2	13	11.4	1	1.4	5	5.4	2	3.6
No Response	49	38.6	25	21.9	10	14.5	13	14.1	13	23.6

TABLE 15 Continued: Types of supplemental collections maintained by respondents in conjunction with primary collection, according to discipline-area.

TYPES OF SUPPLEMENTAL COLLECTIONS	INVERTEBRATE FOSSILS (N=62)		INVERTEBRATES (N=75)		ENTOMOLOGY (N=176)		BOTANY (N=302)		MICROBIOLOGY (N=70)	
	N	%	N	%	N	%	N	%	N	%
Alcoholic Specimens	6	9.7	44	58.7	125	71.0	55	18.2	2	2.9
Audiospectrographs	0	0.0	0	0.0	4	2.3	0	0.0	0	0.0
Chromosome Squashes	0	0.0	1	1.3	8	4.5	14	4.6	0	0.0
Cleared & Stained Skeletons	1	1.6	4	5.3	19	10.8	2	0.7	1	1.4
Drawings	2	3.2	28	37.3	51	29.0	42	13.9	6	8.6
Dry Skeletal Material	3	4.8	15	20.0	12	6.8	9	3.0	0	0.0
Frozen Tissues	0	0.0	2	2.7	0	0.0	2	0.7	3	4.3
Histological Preparations	0	0.0	23	30.7	11	6.3	18	6.0	7	10.0
Motion Pictures	1	1.6	3	4.0	15	8.5	4	1.3	4	5.7
Original Field Notes	20	32.3	40	53.3	74	42.0	108	35.8	6	8.6
Photographic Prints	15	24.2	30	40.0	47	26.7	58	19.2	13	18.6
Radiographs	0	0.0	0	0.0	2	1.1	0	0.0	1	1.4
Recordings	0	0.0	0	0.0	82	46.6	4	1.3	0	0.0
Slides (35mm)	15	24.2	35	46.7	92	52.3	136	45.0	18	25.7
X-Rays	2	3.2	4	5.3	1	0.6	0	0.0	0	0.0
Other[1]/	5	8.1	10	13.3	26	14.8	2	0.7	8	11.4
No Response	32	51.6	16	21.3	30	17.0	103	34.1	40	57.1

[1]/ Bone element collections, spermatozoan preparations, lab notebooks, faunal distribution cards, otoliths, 120mm slides.

TABLE 16: Degree to which specimen-related data are computerized, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE N	NO RESPONSE %	NOT USING COMPUTER N	NOT USING COMPUTER %	USING COMPUTER N	USING COMPUTER %	AVG. % COLLECTION CATALOGUED
MAMMALOGY (N=127)	5	3.9	98	77.2	24	18.9	55.4
ORNITHOLOGY (N=114)	3	2.6	89	78.1	22	19.3	53.3
HERPETOLOGY (N=69)	1	1.4	53	76.8	15	21.7	44.1
ICHTHYOLOGY (N=92)	1	1.1	64	69.6	27	29.3	42.2
VERTEBRATE FOSSILS (N=55)	1	1.8	40	72.7	14	25.5	41.1
INVERTEBRATE FOSSILS (N=62)	3	4.8	47	75.8	12	19.4	40.9
INVERTEBRATES (N=75)	2	2.7	47	62.7	26	34.7	29.5
ENTOMOLOGY (N=176)	4	2.3	152	86.4	20	11.4	26.6
BOTANY (N=302)	4	1.3	235	77.8	63	20.9	28.6
MICROBIOLOGY (N=70)	6	8.6	45	64.3	19	27.1	42.9
TOTAL/AVG. % (N=1142)	26	2.3	874	76.5	242	21.2	40.5

TABLE 17: Different types of units respondents use to catalogue specimens in collections, according to discipline-area.

SPECIMEN-UNITS CATALOGUED	MAMMALOGY (N=127) N	%	ORNITHOLOGY (N=114) N	%	HERPETOLOGY (N=69) N	%	ICHTHYOLOGY (N=92) N	%	VERTEBRATE FOSSILS (N=55) N	%
Individual Specimen	124	97.6	107	93.9	61	88.4	27	29.3	52	94.5
Species/Locality Lots	8	6.3	8	7.0	24	34.9	75	81.5	23	41.8
Specimen Sheets	3	2.4	1	0.9	0	0.0	1	1.1	1	1.8
Smears	0	0.0	0	0.0	0	0.0	1	1.1	0	0.0
Slides	1	0.8	1	0.9	0	0.0	5	5.4	1	1.8
Cultures	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Other[1/]	1	0.8	6	5.3	2	3.0	4	4.3	0	0.0
No Response	2	1.6	4	3.5	1	1.5	0	0.0	1	1.8

TABLE 17 Continued: Different types of units respondents use to catalogue specimens in collections, according to discipline-area.

SPECIMEN-UNITS CATALOGUED	INVERTEBRATE FOSSILS (N=62) N	%	INVERTEBRATES (N=75) N	%	ENTOMOLOGY (N=176) N	%	BOTANY (N=302) N	%	MICROBIOLOGY (N=70) N	%
Individual Specimen	49	79.0	45	60.0	97	55.1	152	50.3	34	48.6
Species/Locality Lots	43	69.4	55	73.3	82	46.6	59	19.5	4	5.7
Specimen Sheets	1	1.6	5	6.7	4	2.3	172	57.0	3	4.3
Smears	1	1.6	0	0.0	0	0.0	3	1.0	0	0.0
Slides	5	8.1	11	14.7	22	12.5	14	4.6	7	10.0
Cultures	1	1.6	0	0.0	0	0.0	5	1.7	44	62.9
Other[1/]	5	8.1	5	6.7	13	7.4	9	3.0	6	8.6
No Response	2	3.2	2	2.7	32	18.2	12	4.0	1	1.4

[1/]Accession number by lots, accession number by specimen, geologic age, larvae by lot.

TABLE 18: Different types of catalogues used by respondents, according to discipline-area.

DISCIPLINE-AREA	TYPE OF CATALOGUE: NUMERIC N	%	TAXONOMIC N	%	GEOGRAPHIC N	%	OTHER 1/ N	%	NO RESPONSE N	%
MAMMALOGY (N=127)	109	85.8	68	53.5	26	20.5	4	3.1	4	3.1
ORNITHOLOGY (N=114)	95	83.3	66	57.9	21	18.4	7	6.1	3	2.6
HERPETOLOGY (N=69)	59	85.5	42	60.9	21	30.4	2	2.9	2	2.9
ICHTHYOLOGY (N=92)	70	76.1	66	71.7	24	26.1	8	8.7	2	2.2
VERTEBRATE FOSSILS (N=55)	52	94.5	31	56.4	17	30.9	13	23.6	1	1.8
INVERTEBRATE FOSSILS (N=62)	52	83.9	38	61.3	21	33.9	15	24.2	2	3.2
INVERTEBRATES (N=75)	49	65.3	57	76.0	24	32.0	7	9.3	3	4.0
ENTOMOLOGY (N=176)	33	18.8	132	75.0	39	22.2	4	2.3	28	15.9
BOTANY (N=302)	82	27.2	257	85.1	92	30.5	30	9.9	20	6.6
MICROBIOLOGY (N=70)	45	64.3	47	67.1	8	11.4	8	11.4	1	1.4
TOTAL/AVG. % (N=1142)	646	56.6	804	70.4	293	25.7	98	8.6	66	5.8

1/ Alphabetical, "genus and species name," by specimen element, stratigraphically, sequentially by acquisition, chronologically according to field collections, special skeleton index, special type-specimen index.

TABLE 19A: Number of catalogued specimen-units in collections, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE	TOTAL SPECIMEN-UNITS	AVERAGE	STANDARD DEVIATION
MAMMALOGY (N=127)	8	2,274,405	19,112.65	60,429.60
ORNITHOLOGY (N=114)	7	3,476,668	32,492.22	102,166.08
HERPETOLOGY (N=69)	1	2,764,780	40,658.53	74,926.30
ICHTHYOLOGY (N=92)	8	4,342,693	51,698.73	193,269.48
VERTEBRATE FOSSILS (N=55)	3	971,189	18,676.71	27,530.31
INVERTEBRATE FOSSILS (N=62)	6	2,513,941	44,891.80	105,597.36
INVERTEBRATES (N=75)	10	13,940,230	214,465.08	1,239,389.82
ENTOMOLOGY (N=176)	53	62,841,769	510,908.69	1,809,414.25
BOTANY (N=302)	28	28,272,220	103,183.28	423,765.84
MICROBIOLOGY (N=70)	6	193,149	3,017.95	6,425.77
TOTAL	130	121,591,044	---	---

TABLE 19B: Number of uncatalogued specimen-units in collections, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE	TOTAL SPECIMEN-UNITS	AVERAGE	STANDARD DEVIATION
MAMMALOGY (N=127)	30	134,324	1,384.78	3,121.33
ORNITHOLOGY (N=114)	33	226,049	2,790.73	8,119.67
HERPETOLOGY (N=69)	14	436,295	7,932.64	40,963.95
ICHTHYOLOGY (N=92)	20	3,695,220	51,322.50	354,278.82
VERTEBRATE FOSSILS (N=55)	9	3,428,336	74,529.04	441,306.10
INVERTEBRATE FOSSILS (N=62)	16	13,690,125	297,611.41	781,720.33
INVERTEBRATES (N=75)	17	2,480,303	42,763.84	115,370.22
ENTOMOLOGY (N=176)	42	40,588,595	302,899.96	933,093.30
BOTANY (N=302)	102	4,727,525	23,637.63	171,449.88
MICROBIOLOGY (N=70)	51	12,122	638.00	995.40
TOTAL	334	69,418,894	---	---

TABLE 20: Percentages of specimen-units uncatalogued, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE	TOTAL SPECIMEN-UNITS	NUMBER UNCATALOGUED SPECIMEN-UNITS	PERCENTAGE SPECIMEN-UNITS UNCATALOGUED
MAMMALOGY (N=127)	3	2,408,729	134,324	5.6
ORNITHOLOGY (N=114)	4	3,702,717	226,049	6.1
HERPETOLOGY (N=69)	0	3,201,075	436,295	13.6
ICHTHYOLOGY (N=92)	5	8,037,913	3,695,220	46.0
VERTEBRATE FOSSILS (N=55)	2	4,399,525	3,428,336	77.9
INVERTEBRATE FOSSILS (N=62)	5	16,204,066	13,690,125	84.5
INVERTEBRATES (N=75)	5	16,420,533	2,480,303	15.1
ENTOMOLOGY (N=176)	18	103,430,364	40,588,595	39.2
BOTANY (N=302)	16	32,999,745	4,727,525	14.3
MICROBIOLOGY (N=70)	4	205,271	12,122	5.9
TOTAL/AVG. %	62	191,009,938	69,418,894	36.3

Physical Characteristics of Collections

Collections are normally maintained in close association with other activity areas that have spatial requirements: offices, laboratories, libraries, and other miscellaneous spatial categories (e.g., specimen preparation rooms, storage rooms for supplies, cold storage rooms, greenhouses). The overall average space dedicated to these activities is 3,230 sq. ft., of which an average of 1,687 sq. ft. is devoted to collections (52%; 58% when Microbiology is excluded) (Table 21).

The average percentage of space allocated to the remaining types of usages is, in descending order: laboratories (20%), offices (12%), "other" (9%), and libraries (7%). When space allocations are viewed on a discipline-area basis, the largest percentage devoted to collections is in Ornithology (70%), the smallest in Microbiology (3%). The greatest percentage of space for offices is found in Invertebrates (18%), the least in Invertebrate Fossils (7%). The greatest percentage of laboratory space is in Microbiology (57%), the least in Ornithology (9%). The greatest percentage of library space is in Botany (12%), the least in Mammalogy (4%). It is apparent that different discipline-areas have assigned different priorities on spatial usages, except collection storage, according to perceived needs.

The questionnaire sought to determine the degree of protection afforded collections against a variety of generally recognized hazards. On the basis of the responses it would appear that "protection" against hazards was interpreted in a variety of ways (Table 22), leading us to believe that the statistics generated are misleading. Hazard protection needs to be more clearly defined and studied in the future. For the present, we believe it best to present negative statistics (i.e., the percentage of institutions that either did not answer the question or indicated that their collections were not protected against particular hazards). Because of the vulnerability of the collection resources to these hazards and the extreme impact the loss of collections would have on research programs, the results are reported in detail here. Of all collections, roughly 38% have no fire protection; 42% have no water damage protection; 17% have no protection against pests (i.e., insects, mildew, molds, etc.); 50% have no control over temperature fluctuations; 64% have no

control over humidity fluctuations; and 22% have no protection against theft or vandalism. In the category "other," the most commonly listed concern was protection against earthquakes.

It is generally accepted among systematists that the two greatest hazards that could destroy collections are fire and water. If one excludes the fossil collections, another great hazard is destructive pests. More attention has been afforded the pest hazard than any other.

In addition to the principal specimen collections and ancillary collections, other equipment or research facilities are used in support of research programs in systematics (Table 23). The most widely available equipment/facilities for all discipline-areas, except Microbiology, are photographic facilities, followed by computers and histology laboratories. Microbiology is a special case, in that the most common facilities are spectrophotometers, electrophoretic facilities, and computers. The surprise here is in the general availability of computers. Overall, an average of 60% of the respondents indicated they had access to computers for research purposes, contrasted with the relatively small percentage (21%; Table 16) of collections using computers to manage specimen-related information.

Libraries generally are considered extremely important adjuncts to collections, in that ready access to published literature can have a significant impact on the productivity of a research scholar. The library used by researchers can be either maintained in a centralized facility in the institution or in close proximity to the specimen collection. Overall, an average of 63% of the collections surveyed have access to a centralized institutional library and 45% reported that a library was associated with the collection (Table 24B). Researchers associated with Microbiology collections are the least likely to have access to a library; 33% have a central institutional library and 20% have a library associated with the collection.

TABLE 21: Allocation of spatial categories associated with collections, as the average square feet and percent of total square feet reported (averages based on total number of respondents in each discipline-area).

DISCIPLINE-AREA	SPATIAL CATEGORIES: OFFICE AVG	OFFICE %	COLLECTION AVG	COLLECTION %	LABORATORY AVG	LABORATORY %	LIBRARY AVG	LIBRARY %	OTHER[1/] AVG	OTHER[1/] %	TOTAL SQUARE FEET
MAMMALOGY (N=127)	362	11.0	1916	58.4	323	9.9	114	3.5	566	17.2	3281
ORNITHOLOGY (N=114)	336	12.9	1815	69.8	241	9.3	143	5.5	66	2.5	2601
HERPETOLOGY (N=69)	292	13.6	1283	56.7	315	14.6	183	8.5	77	3.6	2150
ICHTHYOLOGY (N=92)	403	15.0	1572	58.6	365	13.6	152	5.7	192	7.2	2684
VERTEBRATE FOSSILS (N=55)	488	8.4	3027	52.2	1181	20.4	416	7.2	691	11.9	5803
INVERTEBRATE FOSSILS (N=62)	249	6.9	2361	65.7	654	18.2	194	5.4	138	3.8	3596
INVERTEBRATES (N=75)	832	18.5	2517	55.8	679	15.1	351	7.8	130	2.9	4509
ENTOMOLOGY (N=176)	256	14.6	1061	60.6	257	14.7	103	5.9	73	4.2	1750
BOTANY (N=302)	433	17.3	1226	48.9	378	15.1	303	12.1	167	6.7	2507
MICROBIOLOGY (N=70)	334	9.8	92	2.7	1951	57.0	350	10.2	694	20.3	3421
TOTAL/PERCENT	3985	12.3	16870	52.2	6344	19.6	2309	7.1	2794	8.6	32302

1/Classrooms, laboratories, live collection rooms, darkroom, preparation room, equipment storage, display space, chemical storage, supplemental collection storage.

TABLE 22: Percentages of collections protected against different types of hazards, by discipline-area.

DISCIPLINE-AREA	TYPE OF HAZARD															
	FIRE		TEMPERATURE		PESTS		HUMIDITY		WATER DAMAGE		THEFT		OTHER[1/]	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
MAMMALOGY (N=127)	80	62.9	74	58.3	121	95.3	44	34.6	85	66.9	107	84.3	5	3.9
ORNITHOLOGY (N=114)	76	66.7	60	52.6	113	99.1	39	34.2	74	64.9	101	88.6	3	2.6
HERPETOLOGY (N=69)	47	68.1	42	60.9	53	76.8	25	36.2	41	59.4	61	88.4	5	7.2
ICHTHYOLOGY (N=92)	61	66.3	55	59.8	56	60.9	43	46.7	57	61.9	73	79.3	9	9.7
VERTEBRATE FOSSILS (N=55)	37	67.3	22	40.0	29	52.7	16	29.1	28	50.9	45	81.8	3	5.5
INVERTEBRATE FOSSILS (N=62)	38	61.3	25	40.3	31	50.0	17	27.4	28	45.2	50	80.6	1	1.6
INVERTEBRATES (N=75)	50	66.7	10	13.3	53	70.6	25	33.3	42	56.0	64	85.3	3	4.0
ENTOMOLOGY (N=176)	91	51.7	73	41.5	166	94.3	55	31.3	95	53.9	124	70.5	7	3.9
BOTANY (N=302)	196	64.9	149	49.3	267	88.4	99	32.8	167	55.3	228	75.4	1	0.3
MICROBIOLOGY (N=70)	32	45.7	58	82.9	56	80.0	43	61.4	44	62.9	34	48.6	4	5.7
TOTAL/PERCENT (N=1142)	708	62.0	568	49.7	945	82.7	406	35.6	661	57.9	887	77.7	41	3.6
PERCENT NOT PROTECTED	--	38.0	--	50.3	--	17.3	--	64.4	--	42.1	--	22.3	--	96.4

1/Typhoon, earthquake, dust, light, vibration.

TABLE 23: Availability of equipment/facilities for researchers, according to discipline-area (percentages based on total respondents within each discipline-area).

TYPE OF EQUIPMENT/ FACILITY	MAMMALOGY (N=127)		ORNITHOLOGY (N=114)		HERPETOLOGY (N=69)		ICHTHYOLOGY (N=92)		VERTEBRATE FOSSILS (N=55)	
	N	%	N	%	N	%	N	%	N	%
Biochemical Laboratory	30	23.6	30	26.3	17	24.6	31	33.7	6	10.9
Computer	69	54.3	63	55.3	47	68.1	70	76.1	33	60.0
Electrophoresis	58	45.7	48	42.1	39	56.5	53	57.6	7	12.7
Gas Chromatography	50	39.4	47	41.2	29	42.0	48	52.2	11	20.0
Histology Laboratory	63	49.6	54	47.4	39	56.5	68	73.9	14	25.5
Mass Spectrometer	35	27.6	35	30.7	18	26.1	36	39.1	12	21.8
Motion Analysis	14	11.0	17	14.9	4	5.8	16	17.4	4	7.3
Photography	77	60.6	72	63.2	55	79.7	82	89.1	42	76.4
Radiometric Dating	10	7.9	5	4.4	5	7.3	10	10.9	9	16.4
Scan. Elec. Microscope	41	32.3	44	38.6	31	44.9	48	52.2	25	45.5
Sound Analysis	29	22.8	30	26.3	15	21.7	25	27.2	3	5.5
Sound Recording	49	38.6	57	50.0	27	39.1	40	43.5	17	30.9
Spectrophotometer	44	34.7	42	36.8	33	47.8	62	67.4	8	14.6
Trans. Elec. Microscope	36	28.4	35	30.7	24	34.8	42	45.7	11	20.0
X-Ray	38	29.9	27	23.7	26	37.7	50	54.4	21	38.2
Other[1]/	10	7.9	2	1.8	7	10.1	9	9.8	6	10.9
No Response	14	11.0	25	21.9	7	10.0	3	3.3	8	14.6

TABLE 23 Continued: Availability of equipment/facilities for researchers, according to discipline-area (percentages based on total respondents within each discipline-area).

TYPE OF EQUIPMENT/ FACILITY	INVERTEBRATE FOSSILS (N=62)		INVERTEBRATES (N=75)		ENTOMOLOGY (N=176)		BOTANY (N=302)		MICROBIOLOGY (N=70)	
	N	%	N	%	N	%	N	%	N	%
Biochemical Laboratory	7	11.3	15	20.0	41	23.3	80	26.5	45	64.3
Computer	34	54.8	48	64.0	87	49.4	165	54.6	44	62.9
Electrophoresis	8	12.9	28	37.3	73	41.5	127	42.1	51	72.9
Gas Chromatography	14	22.6	31	41.3	77	43.8	136	45.0	44	62.9
Histology Laboratory	17	27.4	49	65.3	80	45.5	152	50.3	40	57.1
Mass Spectrometer	19	30.6	18	24.0	55	31.3	83	27.5	28	40.0
Motion Analysis	3	4.8	13	17.3	23	13.1	23	7.6	6	8.6
Photography	44	71.0	54	72.0	108	61.4	195	64.6	48	68.6
Radiometric Dating	9	14.5	14	18.7	18	10.2	26	8.6	11	15.7
Scan. Elec. Microscope	28	45.2	40	53.3	65	36.9	111	36.8	36	51.4
Sound Analysis	4	6.5	10	13.3	32	18.2	27	8.9	7	10.0
Sound Recording	10	16.1	20	26.7	53	30.1	82	27.2	15	21.4
Spectrophotometer	11	17.7	33	44.0	59	33.5	140	46.4	52	74.3
Trans. Elec. Microscope	22	35.5	34	45.3	60	34.1	119	39.4	44	62.9
X-Ray	32	51.6	26	34.7	45	25.6	49	16.2	22	31.4
Other[1]/	13	21.0	12	16.0	27	15.3	27	8.9	8	11.4
No Response	8	12.9	15	20.0	51	29.0	81	26.8	8	11.4

[1]/Compound microscope, camera, camera lucida, aquaria systems, field vessel or vehicle, scuba facilities.

TABLE 24A: Number of institutions that maintain library facilities, according to discipline-area.

DISCIPLINE-AREA	BASIC N	CENTRALIZED INSTITUTIONAL LIBRARY			COLLECTION ASSOCIATED LIBARY		
		NO RESPONSE	Yes	No	NO RESPONSE	Yes	No
MAMMALOGY	127	6	77	44	7	38	82
ORNITHOLOGY	114	2	78	34	2	48	64
HERPETOLOGY	69	1	32	36	0	35	34
ICHTHYOLOGY	92	0	58	34	0	45	47
VERTEBRATE FOSSILS	55	1	43	11	1	29	25
INVERTEBRATE FOSSILS	62	2	36	24	3	30	29
INVERTEBRATES	75	2	49	24	3	47	25
ENTOMOLOGY	176	11	118	47	9	100	67
BOTANY	302	11	201	91	10	124	168
MICROBIOLOGY	70	1	23	46	1	14	55
TOTAL	1142	37	715	391	36	510	596

TABLE 24B: Percentages of institutions that maintain library facilities, according to discipline-area.

DISCIPLINE-AREA	BASIC N	CENTRALIZED INSTITUTIONAL LIBRARY			COLLECTION ASSOCIATED LIBRARY		
		NO RESPONSE	Yes	No	NO RESPONSE	Yes	No
MAMMALOGY	127	4.7	60.6	34.6	5.5	29.9	64.6
ORNITHOLOGY	114	1.8	68.4	29.8	1.8	42.1	56.1
HERPETOLOGY	69	1.4	46.4	52.2	0.0	50.7	49.3
ICHTHYOLOGY	92	0.0	63.0	37.0	0.0	48.9	51.1
VERTEBRATE FOSSILS	55	1.8	78.2	20.0	1.8	52.7	45.4
INVERTEBRATE FOSSILS	62	3.2	58.1	38.7	4.8	48.4	46.8
INVERTEBRATES	75	2.7	65.3	32.0	4.0	62.7	33.3
ENTOMOLOGY	176	6.3	67.0	26.7	5.1	56.8	38.1
BOTANY	302	3.6	66.6	30.1	3.3	41.1	55.6
MICROBIOLOGY	70	1.4	32.9	65.7	1.4	20.0	78.6
AVERAGE PERCENT	1142	3.2	62.6	34.2	3.1	44.7	52.2

Collection Personnel

The number of staff associated with collections may be interpreted in a variety of ways, but we have chosen to base the analysis on the number of persons involved by type of position (Tables 25A and 25B) and then to convert these persons, by means of their positions, into Full Time Equivalent (FTE) personnel, based on the percentage of time formally assigned to collection-related activities (Tables 27A and 27B).

In each discipline, except Microbiology, the number of curators associated with collections slightly exceeds the number of collections in the discipline. Overall, based on the number of individuals by position irrespective of the percentage of time actually spent on collection-related activities, 23.9% of the total work force associated with collections are curators, 16.2% are volunteers, 15.5% are graduate students, 13.9% are preparators, 9.6% are undergraduates, 7.8% are hourly personnel, 4.4% are clerical, and 1.7% hold post doctoral positions. For each curator there is 0.72 preparator. Other personnel associated with the collections, representing a broad spectrum of types that probably represent local variations in position titles, comprise 7% of the work force. When both graduate and undergraduate students are pooled, they represent 25% of the work force that maintain biological collections. Students play an important role in maintaining collections, but recruitment is affected not only by limited funds but by the overall enrollment in academic institutions.

Volunteers represent a significant component of collection personnel. Certain discipline-areas rely on volunteer help more extensively than others. The percentages (in descending order) are: Vertebrate Fossils (40.1%), Mammalogy (19.4%), Ornithology (17.6%), Botany (16.6%), Invertebrates (13.5%), Invertebrate Fossils (12.7%), Ichthyology (10.5%), Entomology (8.3%), Herpetology (7.1%), and Microbiology (1.9%) (Table 25B).

It is of interest that curators generally consider volunteers to be either "not important" or "seldom important" to the maintenance of the collections (Table 26). From the responses to this survey, it is clear that volunteers could be expected to play a continuing, if not increasing, role in maintaining collections, even though they may require supervision by a professional.

When numbers of individuals associated with collections are adjusted according to the amount of time formally allocated to the collection (FTE), the most startling and disturbing findings become apparent (Tables 27A and 27B). Following this adjustment, the ratio of FTE curator to collections is altered drastically: 1 curator for each 1.95 collections. Thus, nearly half of the collections of the nation are not receiving the FTE of one curator. The ratio of curators to preparators remains relatively unchanged; however, one FTE preparator only is available for each 2.71 collections. The heavy volunteer and graduate student participation noted previously when adjusted to FTE undergoes similar reductions.

The highest percentage FTE allocated to curators by discipline-area is in Entomology (42.6%), while the lowest is in Ornithology (24.0%) (Table 27B). The highest percent allocated to preparators is in Microbiology (34.9%), and the lowest is in Invertebrates (14.5%).

TABLE 25A: Number of personnel associated with collections according to type of position, by discipline-area.

DISCIPLINE-AREA	TYPE OF POSITION									
	CURATOR	PREPARATORS	CLERICAL	POST DOCT.	GRAD. STUD.	UNDER GRAD.	HOURLY	VOLUNTEERS	OTHER[1]	TOTAL
MAMMALOGY (N=127)	131	70	22	3	83	74	53	113	33	582
ORNITHOLOGY (N=114)	119	83	20	12	51	87	33	92	25	522
HERPETOLOGY (N=69)	81	46	19	6	44	42	27	21	8	294
ICHTHYOLOGY (N=92)	106	78	19	3	76	51	39	47	28	447
VERTEBRATE FOSSILS (N=55)	70	45	13	13	100	12	85	240	21	599
INVERTEBRATE FOSSILS (N=62)	88	32	42	2	43	41	19	42	21	330
INVERTEBRATES (N=75)	94	44	22	9	129	36	25	63	43	465
ENTOMOLOGY (N=176)	236	105	44	11	108	50	51	64	101	770
BOTANY (N=302)	420	211	49	29	267	146	129	268	91	1610
MICROBIOLOGY (N=70)	66	104	10	14	14	28	9	5	16	266
TOTAL	1411	818	260	102	915	567	470	955	387	5885

1/ Visiting researchers, adjunct faculty, curatorial assistants, volunteer scientists, field assistants, hourly workers under the Comprehensive Employment Training Act (CETA), curators emeriti, illustrators, research associates.

TABLE 25B: Percentages of total personnel according to type of position, by discipline-area.

DISCIPLINE-AREA	TYPE OF POSITION: CURATOR	PREPARATORS	CLERICAL	POST DOCT.	GRAD. STUD.	UNDER GRAD.	HOURLY	VOLUNTEERS	OTHER[1/]
MAMMALOGY (N=127)	22.5	12.8	3.8	0.5	14.3	12.7	9.1	19.4	5.7
ORNITHOLOGY (N=114)	22.8	15.9	3.8	2.3	9.8	16.7	6.3	17.6	4.8
HERPETOLOGY (N=69)	27.6	15.6	6.5	2.0	15.0	14.3	9.2	7.1	2.7
ICHTHYOLOGY (N=92)	23.7	17.4	4.2	0.7	17.0	11.4	8.7	10.5	6.3
VERTEBRATE FOSSILS (N=55)	11.7	7.5	2.2	2.2	16.7	2.0	14.2	40.1	3.5
INVERTEBRATE FOSSILS (N=62)	26.7	9.7	12.7	0.6	13.0	12.4	5.8	12.7	6.4
INVERTEBRATES (N=75)	20.0	9.5	4.7	1.9	27.7	7.7	5.4	13.5	9.2
ENTOMOLOGY (N=176)	30.6	13.6	5.7	1.4	14.0	6.5	6.6	8.3	13.1
BOTANY (N=302)	26.1	13.1	3.0	1.8	16.6	9.1	8.0	16.6	5.7
MICROBIOLOGY (N=70)	24.8	39.1	3.8	5.3	5.3	10.5	3.4	1.9	6.0
AVG. %	23.9	13.9	4.4	1.7	15.5	9.6	7.8	16.2	6.6

[1/] Visiting researchers, adjunct faculty, curatorial assistants, volunteer scientists, field assistants, hourly workers under the Comprehensive Employment Training Act (CETA), curators emeriti, illustrators, research associates.

TABLE 26: Relative perceived importance of volunteers to the maintenance of collections, by discipline-area.

DISCIPLINE-AREA	IMPORTANCE OF VOLUNTEERS: VERY CRITICAL N	%	IMPORTANT N	%	IMPORTANT N	%	SELDOM IMPORTANT N	%	NOT IMPORTANT N	%	NO ANSWER N	%
MAMMALOGY (N=127)	5	3.9	16	12.6	24	18.9	36	28.3	42	33.1	4	3.2
ORNITHOLOGY (N=114)	6	5.3	6	5.3	22	19.3	31	27.2	48	42.1	1	0.9
HERPETOLOGY (N=69)	2	2.9	13	18.8	10	14.5	25	36.2	19	27.5	0	0.0
ICHTHYOLOGY (N=92)	4	4.3	12	13.0	13	14.0	30	32.6	31	33.7	2	0.0
VERTEBRATE FOSSILS (N=55)	2	3.6	5	9.1	14	25.5	17	30.9	16	29.1	1	1.8
INVERTEBRATE FOSSILS (N=62)	4	6.5	2	3.2	8	12.9	19	30.6	26	41.9	3	4.8
INVERTEBRATES (N=75)	6	8.0	9	12.0	5	6.7	19	25.3	32	42.7	4	5.3
ENTOMOLOGY (N=176)	19	10.8	6	3.4	24	13.6	52	29.5	63	35.8	12	6.8
BOTANY (N=302)	30	9.9	27	8.9	41	13.6	68	22.5	126	41.7	10	3.3
MICROBIOLOGY (N=70)	4	5.7	0	0.0	4	5.7	14	20.0	47	67.1	1	1.4
TOTAL/PERCENT	82	13.9	96	8.4	165	14.4	311	27.2	450	39.4	38	3.3

TABLE 27A: "Full Time Equivalent" (FTE) personnel, based on time allocated to collection, according to type of position, by discipline-area.

DISCIPLINE-AREA	TYPE OF POSITION: CURATOR	PREPARATORS	CLERICAL	POST DOCT.	GRAD. STUD.	UNDER GRAD.	HOURLY	VOLUNTEERS	OTHER[1]	TOTAL
MAMMALOGY (N=127)	48.5	37.8	7.5	1.3	17.2	16.8	12.1	19.1	8.5	168.8
ORNITHOLOGY (N=114)	29.5	28.8	4.4	0.1	7.5	13.6	9.2	20.2	9.2	122.5
HERPETOLOGY (N=69)	35.4	27.4	9.6	3.6	10.0	7.0	11.0	4.0	3.3	111.3
ICHTHYOLOGY (N=92)	43.3	47.0	9.2	3.0	14.2	12.8	9.0	11.4	13.5	163.4
VERTEBRATE FOSSILS (N=55)	37.2	27.0	4.2	2.2	12.9	0.1	16.8	15.3	9.8	125.5
INVERTEBRATE FOSSILS (N=62)	41.6	24.2	8.8	1.5	14.0	10.1	8.0	1.8	6.8	116.8
INVERTEBRATES (N=75)	44.2	23.8	12.1	2.0	51.2	4.5	7.2	9.3	9.4	163.7
ENTOMOLOGY (N=176)	117.8	55.3	21.8	3.1	19.9	11.4	14.6	12.3	20.0	276.2
BOTANY (N=302)	157.4	111.0	25.3	9.2	32.0	18.8	27.9	33.4	19.2	434.2
MICROBIOLOGY (N=70)	30.6	37.8	5.8	2.7	10.2	3.2	1.9	3.1	13.2	108.5
TOTAL (N=1142)	585.5	420.1	108.7	28.7	189.1	98.3	117.7	129.9	112.9	1790.9

[1] Visiting researchers, adjunct faculty, curatorial assistants, volunteer scientists, field assistants, hourly workers under the Comprehensive Employment Training Act (CETA), curators emeriti, illustrators, research associates.

TABLE 27B: Percentages of "Full Time Equivalent" (FTE) personnel, according to type of position, by discipline-area.

DISCIPLINE-AREA	TYPE OF POSITION: CURATOR	PREPARATORS	CLERICAL	POST DOCT.	GRAD. STUD.	UNDER GRAD.	HOURLY	VOLUNTEERS	OTHER[1]
MAMMALOGY (N=127)	28.8	22.4	4.5	0.8	10.2	10.0	7.2	11.3	5.0
ORNITHOLOGY (N=114)	24.0	23.5	3.6	0.0	6.1	11.1	7.5	16.5	7.5
HERPETOLOGY (N=69)	31.8	24.6	8.6	3.2	9.0	6.3	9.9	3.6	3.0
ICHTHYOLOGY (N=92)	26.5	28.8	5.6	1.8	8.7	7.8	5.5	7.0	8.3
VERTEBRATE FOSSILS (N=55)	29.6	21.5	3.4	1.8	10.3	0.1	13.4	12.2	7.8
INVERTEBRATE FOSSILS (N=62)	35.6	20.7	7.5	1.3	11.3	8.7	6.9	1.5	5.8
INVERTEBRATES (N=75)	27.0	14.5	7.4	1.2	31.3	2.8	4.4	5.7	5.7
ENTOMOLOGY (N=176)	42.6	20.0	7.9	1.1	7.2	4.1	5.3	4.5	7.2
BOTANY (N=302)	36.2	25.6	5.8	2.1	7.4	4.3	6.4	7.7	4.4
MICROBIOLOGY (N=70)	28.2	34.9	5.4	2.5	9.4	3.0	1.8	2.9	12.2
AVERAGE PERCENT (N=1790.9)[2]	32.7	23.5	6.1	1.6	10.6	5.5	6.6	7.3	6.3

[1] Visiting researchers, adjunct faculty, curatorial assistants, volunteer scientists, field assistants, hourly workers under the Comprehensive Employment Training Act (CETA), curators emeriti, illustrators, research associates.

[2] From Table 27A; total FTE personnel.

Collection Growth

Of the 1,142 collections whose responses are analyzed here, 1,007 (88%) added specimen-units to their collections in the past five years, 1976-1981 (Table 28). Based on those responding, most discipline-areas experienced substantive growth in this time period, amounting to approximately 24,400,000 specimen-units or 15% of the total specimen-units reported. Therefore, on the average these collections grew at the rate of 3% per year during those five years. The greatest average number of specimen-units added per collection was in Invertebrates (165,191), followed by Entomology (53,273) and Ichthyology (15,867). The lowest average number of specimen-units added to collections was in Microbiology (1,100). The relatively high standard deviations indicate that the major growth surge is concentrated in relatively few collections (Table 28).

Overall, less than 50% of the collections made additions to their collections in 1980 (Table 29). When the types of acquisitions that are contributing to the growth rate in 1980 are examined according to the number of collections acquiring specimen-units, the greatest contributions are from gifts (41% of collections), unsupported professional research (37%), and grant supported research (26%). Collection growth resulting from grant supported research for discipline-areas other than Microbiology is significant, ranging from 15% of the collections in Ornithology to 35% of the collections in Invertebrates. Exchange plays a major role in collection growth in more than 30% of the collections in Botany and Entomology.

Both the total specimen-units added and the average number of specimen-units added to a collection per discipline-area in 1980 further substantiate the trend identified above (Tables 30 and 31). A total of 5,592,494 specimen-units were added to collections in 1980; 33% of the specimens were acquired as gifts, 19% from unsupported professional research, and 26% as a result of grant supported research. The type of acquisition seems to bear little direct influence on the highest priority (judged by the average total number of specimen-units added per collection) in a discipline-area for adding specimen-units to a collection (Table 31). Thus the "other" type of acquisition represents the highest average number of specimen-units added to collections in the discipline-areas of Mammalogy, Vertebrate Fossils, and Microbiology. "Other" includes two important components: staff and graduate student collections. Purchased specimen-units appear to be important only in Ornithology.

Any level of collection growth eventually generates a need for expanded space. Respondents projected collection space needs for the next five year period (Table 32). Overall, 50% of the collections will require additional space totalling approximately 400,000 sq. ft., an average of 7,000 sq. ft. per collection. Of the total square feet of collection storage space that is needed, more than 25% will be needed in Botany collections. The cost of meeting these needs will be dependent on whether new space is constructed or existing space converted for specimen-unit storage. The former is preferable if the collection is to receive maximum protection from potential hazards.

TABLE 28: Number of specimen-units added to collections between 1976 and 1981, according to discipline-area.

DISCIPLINE-AREA	NO RESPONSE	TOTAL SPECIMEN-UNITS ADDED	AVERAGE	STANDARD DEVIATION
MAMMALOGY (N=127)	8	276,635	2,324.66	5,303.75
ORNITHOLOGY (N=114)	7	253,936	2,373.23	7,692.50
HERPETOLOGY (N=69)	3	317,857	4,816.02	9,323.39
ICHTHYOLOGY (N=92)	9	1,317,003	15,867.51	77,363.91
VERTEBRATE FOSSILS (N=55)	7	167,271	3,484.81	5,220.51
INVERTEBRATE FOSSILS (N=62)	13	490,676	10,013.80	27,509.33
INVERTEBRATES (N=75)	8	11,067,818	165,191.31	1,221,553.61
ENTOMOLOGY (N=176)	35	7,511,526	53,273.23	126,964.23
BOTANY (N=302)	35	2,967,294	11,113.46	33,142.04
MICROBIOLOGY (N=70)	10	66,004	1,100.07	2,279.27
TOTAL (N=1142)	135	24,436,020	---	---

TABLE 29: Number and percentages of collections acquiring specimen-units during 1980, by type of acquisition, according to discipline-area.

TYPE OF ACQUISITION	MAMMALOGY (N=127)		ORNITHOLOGY (N=114)		HERPETOLOGY (N=69)		ICHTHYOLOGY (N=92)		VERTEBRATE FOSSILS (N=55)	
	N	%	N	%	N	%	N	%	N	%
Exchange	25	19.7	28	24.6	8	11.6	23	25.0	11	20.1
Gifts	56	44.1	49	43.0	33	47.8	40	43.5	22	40.0
Grant Supported Research	33	26.0	17	14.9	22	31.9	31	33.7	11	20.0
Purchase	9	7.1	5	4.4	5	7.2	2	2.2	6	10.9
Undergraduate Research	26	20.5	12	10.5	19	27.5	19	20.7	4	7.3
Unsupported Professional Research	52	40.9	36	31.6	33	47.8	38	41.3	18	32.7
Other[1/]	23	18.1	26	22.8	9	13.0	17	18.5	8	14.5

TABLE 29 Continued: Number and percentages of collections acquiring specimen-units during 1980, by type of acquisition, according to discipline-area.

TYPE OF ACQUISITION	INVERTEBRATE FOSSILS (N=62)		INVERTEBRATES (N=75)		ENTOMOLOGY (N=176)		BOTANY (N=302)		MICROBIOLOGY (N=70)	
	N	%	N	%	N	%	N	%	N	%
Exchange	12	19.4	19	25.3	64	36.4	113	37.4	13	18.6
Gifts	21	33.9	36	48.0	61	34.7	122	40.4	26	37.1
Grant Supported Research	18	29.0	26	34.7	42	23.9	60	19.9	21	30.0
Purchase	15	24.2	5	6.7	26	14.8	15	5.0	17	24.3
Undergraduate Research	12	19.4	9	12.0	19	10.8	71	23.5	6	8.6
Unsupported Professional Research	22	35.5	33	44.0	70	39.8	139	46.0	9	12.9
Other[1/]	7	11.3	13	17.3	37	21.0	55	18.2	9	12.9

TABLE 30: Number of specimen-units added to collections during 1980, by type of acquisition, according to discipline-area.

TYPE OF ACQUISITION	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Exchange	2,621	12,997	1,317	1,192	755
Gifts	8,381	13,499	12,645	508,611	962
Grant Supported Research	21,218	3,876	16,743	224,324	10,097
Purchase	1,722	37,053	170	11	233
Undergraduate Research	2,302	474	4,092	4,044	724
Unsupported Professional Research	14,366	10,932	28,173	73,409	14,148
Other[1/]	29,786	22,049	3,544	12,287	7,161
TOTAL	80,396	100,880	66,684	823,878	34,080

[1/]Faunal or floral inventories, staff collections, graduate student research, salvage, commercial fishermen, repository for government agency collections, laboratory/teaching programs.

TABLE 30 Continued: Number of specimen-units added to collections during 1980, by type of acquisition, according to discipline-area.

TYPE OF ACQUISITION	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Exchange	1,914	2,760	35,748	234,906	324
Gifts	14,920	182,439	931,302	155,586	918
Grant Supported Research	52,842	132,874	851,589	107,875	13,183
Purchase	3,665	24,363	136,159	23,144	257
Undergraduate Research	7,390	798	26,485	19,824	44
Unsupported Professional Research	36,301	26,118	693,133	152,299	452
Other[1/]	4,085	14,387	517,341	58,202	12,949
TOTAL	121,117	393,739	3,191,757	751,836	28,127

TABLE 31: Average number of specimen-units added to collections during 1980, by type of acquisition, according to discipline-area (based on those collections reporting additions).

TYPE OF ACQUISITION	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Exchange	104.8	464.2	164.6	51.8	68.6
Gifts	149.7	275.5	383.2	125,215.3	43.7
Grant Supported Research	643.0	228.0	761.1	7,236.3	917.9
Purchase	191.3	7,410.6	34.0	5.5	38.8
Undergraduate Research	88.5	39.5	215.4	212.8	181.0
Unsupported Professional Research	273.3	303.7	853.7	1,931.8	786.0
Other[1/]	1,295.0	848.0	393.4	722.8	895.1

TABLE 31 Continued: Average number of specimen-units added to collections during 1980, by type of acquisition, according to discipline-area (based on those collections reporting additions).

TYPE OF ACQUISITION	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Exchange	159.5	145.3	550.0	2,052.3	24.9
Gifts	710.5	5,067.8	15,267.3	112,750.7	35.3
Grant Supported Research	2,935.7	5,110.5	20,275.9	1,797.9	627.8
Purchase	244.3	4,872.6	5,236.9	1,542.9	15.1
Undergraduate Research	615.8	86.7	1,394.0	279.2	7.3
Unsupported Professional Research	1,650.0	791.5	9,901.9	1,095.7	50.2
Other[1/]	583.6	1,106.7	13,982.2	1,058.2	1,439.8

[1/] Faunal or floral inventories, staff collections, graduate student research, salvage, commercial fishermen, repository for government agency collections, laboratory/teaching programs.

TABLE 32: Additional space (in square feet) needed over next five years, by discipline-area (based on collection growth rates in 1982).

DISCIPLINE-AREA	COLLECTIONS NEEDING ADDITIONAL SPACE N	%	TOTAL SQUARE FEET NEEDED	AVERAGE SQUARE FEET NEEDED	COLLECTIONS NOT NEEDING ADDITIONAL SPACE N	%
MAMMALOGY (N=127)	64	50.4	38,024	594.13	63	49.6
ORNITHOLOGY (N=114)	51	44.7	39,325	771.08	63	55.3
HERPETOLOGY (N=69)	41	59.4	22,658	552.63	28	40.6
ICHTHYOLOGY (N=92)	54	58.7	32,675	1,160.65	38	41.3
VERTEBRATE FOSSILS (N=55)	31	56.4	37,846	1,220.84	24	43.6
INVERTEBRATE FOSSILS (N=62)	34	54.8	31,820	935.88	28	45.2
INVERTEBRATES (N=75)	39	52.0	41,017	369.52	36	48.0
ENTOMOLOGY (N=176)	88	50.0	40,334	458.34	88	50.0
BOTANY (N=302)	138	45.7	121,796	882.58	164	54.3
MICROBIOLOGY (N=70)	29	41.4	2,595	89.48	41	58.6
TOTAL/PERCENT	569	49.8	408,090	7,035.13	573	50.2

Collection Based Services

Collections and associated staff provide an array of services designed to meet the needs of a broader research community and the lay public. The vast majority of services are provided free of charge to the lay public and as a professional courtesy to other researchers. However, fee schedules have been developed in some collections for services to businesses or government agencies.

The most common services provided in conjunction with collections are (in rank order): loan of specimens (80% of collections), specimen identification (76%), facilities for visiting researchers (75%), and in-house use of collections (73%).

A brief summary of types of services provided by the systematics community is presented below.

A. General Informational Services are provided by 779 collections (68%); 86% of those providing this service have not established a fee schedule (Table 33).

B. Loan of Specimens is provided by 913 collections (80%); 89% of those providing this service have not established a fee schedule (Table 34). Of those collections responding, 729 made a total of 16,809 loans in 1980, comprised of 950,311 specimens (Table 35). The largest number of loans was made in Botany (3,334, averaging 92 specimens per loan), and the greatest number of specimens loaned was in Entomology (380,728 in 2,411 loans, averaging 158 specimens per loan).

C. Loan of Type Specimens is provided by far fewer collections, 390 (34%); 93% of those providing this service have not established a fee schedule (Table 36).

D. Visitors to the collections place a heavy burden on staff, and the data have proven to be difficult to interpret because of the wide variety of persons involved, ranging from visiting researchers to secondary school groups (Tables 37A and 37B). The categories of "Lay Persons" and "Others" are virtually useless for analysis purposes, in that many

times they are not comparable between discipline-areas; some figures are obviously weighted by counting each individual in a school group that tours the collection. However, respondents reported that a total of 9,384 "Visiting Researchers" and 6,892 "Graduate Students" used their collections in 1980. Presumably, these categories of visitors are strongly correlated with research activities in the disciplines. Overall, the heaviest users of collections appear to be botanists.

E. Research Facilities are made available to visitors by 854 collections (75%); 89% of those providing this service have not established a fee schedule (Table 38).

F. Access to Specimens at the Collection by qualified individuals is provided by 828 collections (72%); 89% of those providing this service have not established a fee schedule (Table 39).

G. Identification Services are provided by 866 collections (76%); 82% of those providing this service have not established a fee schedule (Table 40).

H. Specimen Preparation Services are provided by 457 collections (40%); 76% of those providing this service have not established a fee schedule (Table 41).

I. Specimen Storage/Repository Services are provided by 469 collections (41%); 84% of those providing this service have not established a fee schedule (Table 42).

J. Isolation of Pure (Living) Cultures is provided by 112 collections (10%); 88% of those providing this service have not established a fee schedule (Table 43).

K. Maintenance of Genetic Stocks is provided by 94 collections (8%); 88% of those providing this service have not established a fee schedule (Table 44).

L. Computer/Data Management Services are provided by 180 collections (16%); 81% of those providing this service have not established a fee schedule (Table 45).

M. Training Services in Collection Management are provided by 233 collections (20%); 84% of those providing this service have not established a fee schedule (Table 46).

N. Institutional Publications represent an important service to the systematics community. A wide variety of publications that support research and collections was identified. The data were gathered by collection discipline-area; because most institutions support collections in more than one discipline data are therefore valid only within a discipline-area. The most common publications are "irregular papers," except in Herpetology, where "monographs" are most common. Perhaps of greater significance is the high percentage of collections that did not respond: 25% to 58%, depending on the discipline-area.

TABLE 33: Number of collections providing general informational services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	NUMBER AVAILABLE %	FEES CHARGED Yes	FEES CHARGED %	FEES CHARGED No	FEES CHARGED %
MAMMALOGY	127	85	66.9	16	18.8	69	81.2
ORNITHOLOGY	114	82	71.9	10	12.2	72	87.8
HERPETOLOGY	69	59	85.5	10	16.9	49	83.1
ICHTHYOLOGY	92	71	77.2	17	23.9	54	76.1
VERTEBRATE FOSSILS	55	43	78.2	2	4.7	41	95.3
INVERTEBRATE FOSSILS	62	35	56.5	1	2.9	34	97.1
INVERTEBRATES	75	54	72.0	8	14.8	46	85.2
ENTOMOLOGY	176	127	72.2	14	11.0	113	89.0
BOTANY	302	181	59.9	23	12.7	158	87.3
MICROBIOLOGY	70	42	60.0	6	14.3	36	85.7
TOTAL/PERCENT	1142	779	68.2	107	13.7	672	86.3

TABLE 34: Number of collections providing loan of specimen services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	103	81.1	14	13.6	90	87.4
ORNITHOLOGY	114	96	84.2	15	15.6	81	84.4
HERPETOLOGY	69	59	85.5	6	10.2	53	89.8
ICHTHYOLOGY	92	78	84.8	11	14.1	67	85.9
VERTEBRATE FOSSILS	55	52	94.5	2	3.8	50	96.2
INVERTEBRATE FOSSILS	62	45	72.6	3	6.7	42	93.3
INVERTEBRATES	75	64	85.3	10	15.6	54	84.4
ENTOMOLOGY	176	152	86.4	10	6.6	142	93.4
BOTANY	302	227	75.2	21	9.3	206	90.7
MICROBIOLOGY	70	37	52.9	6	16.2	31	83.8
TOTAL/PERCENT	1142	913	79.9	98	10.7	815	89.3

TABLE 35: Summary of specimen loan activity in 1980, by collection, according to discipline-area.

LOAN ACTIVITY CATEGORY	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
NO RESPONSE/NO LOANS	38	48	19	26	15
COLLECTIONS MAKING LOANS	89	66	50	66	40
TOTAL LOANS MADE	1,047	1,237	1,138	2,244	432
TOTAL SPECIMENS LOANED	16,708	18,173	21,285	104,604	10,324
COLLECTIONS REPORTING SPECIMENS LOANED	86	66	50	64	39
AVERAGE NUMBER SPECIMENS PER LOAN	16.0	14.7	18.7	46.6	23.9
AVERAGE NUMBER SPECIMENS LOANED PER COLLECTION	194.3	275.4	425.7	1,634.4	264.7

TABLE 35 Continued: Summary of specimen loan activity in 1980, by collection, according to discipline-area.

LOAN ACTIVITY CATEGORY	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
NO RESPONSE/NO LOANS	30	21	43	133	40
COLLECTIONS MAKING LOANS	32	54	133	169	30
TOTAL LOANS MADE	1,490	2,401	2,411	3,334	1,075
TOTAL SPECIMENS LOANED	25,454	65,980	380,728	305,429	1,626
COLLECTIONS REPORTING SPECIMENS LOANED	30	51	129	169	26
AVERAGE NUMBER SPECIMENS PER LOAN	17.1	27.5	157.9	91.6	1.5
AVERAGE NUMBER SPECIMENS LOANED PER COLLECTION	848.5	1,293.7	2,951.4	1,807.3	62.5

TABLE 36: Number of collections providing loan of type specimen services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	NUMBER AVAILABLE %	FEES CHARGED Yes	FEES CHARGED %	FEES CHARGED No	FEES CHARGED %
MAMMALOGY	127	12	9.4	0	0.0	12	100.0
ORNITHOLOGY	114	14	12.3	2	14.3	12	85.7
HERPETOLOGY	69	26	37.7	1	3.8	25	96.2
ICHTHYOLOGY	92	29	31.5	3	10.3	26	89.7
VERTEBRATE FOSSILS	55	32	58.2	0	0.0	32	100.0
INVERTEBRATE FOSSILS	62	29	46.8	3	10.3	26	89.7
INVERTEBRATES	75	30	40.0	3	10.0	27	90.0
ENTOMOLOGY	176	76	43.2	4	5.3	72	94.7
BOTANY	302	119	39.4	6	5.0	113	95.0
MICROBIOLOGY	70	23	32.9	7	30.4	16	69.6
TOTAL/PERCENT	1142	390	34.2	29	7.4	361	92.6

TABLE 37A: Number of visitors to collections in 1980 by type of visitor, according to discipline-area.

DISCIPLINE-AREA	VISITING RESEARCHERS N	%	COMMERCIAL FIRMS N	%	GOVERNMENT AGENCIES N	%	GRADUATE STUDENTS N	%	UNDERGRADUATE STUDENTS N	%	LAY PERSONS N	%	OTHERS 1/ N	%	TOTAL
MAMMALOGY (N=127)	729	22.6	96	3.0	283	8.8	774	24.0	692	21.4	52	1.6	605	18.7	3,231
ORNITHOLOGY (N=114)	540	1.0	160	0.3	273	0.5	660	1.2	4,020	7.3	6,184	11.2	43,464	78.6	55,301
HERPETOLOGY (N=69)	472	13.8	28	0.9	143	4.2	338	9.8	991	28.9	1,429	41.6	32	0.9	3,433
ICHTHYOLOGY (N=92)	712	8.4	251	3.0	319	3.7	768	9.0	2,073	24.4	1,571	18.5	2,813	33.1	8,507
VERTEBRATE FOSSILS (N=55)	467	11.1	18	0.4	53	1.3	313	7.5	1,413	33.7	72	1.7	1,857	44.3	4,193
INVERTEBRATE FOSSILS (N=62)	494	5.1	39	0.4	50	0.5	193	2.0	494	5.1	5,974	61.2	2,510	25.7	9,754
INVERTEBRATES (N=75)	580	7.7	79	1.0	199	2.6	448	5.9	1,724	22.8	3,444	45.5	1,102	14.6	7,576
ENTOMOLOGY (N=175)	1,892	7.4	407	1.6	671	2.6	915	3.6	3,160	12.4	6,974	27.4	11,402	44.9	25,421
BOTANY (N=302)	3,312	3.4	697	0.0	1,535	1.6	2,287	2.3	5,406	5.5	73,832	75.7	10,531	10.8	97,600
MICROBIOLOGY (N=70)	186	0.8	6,941	28.6	3,548	14.6	196	0.8	652	2.7	13	0.1	12,723	52.5	24,259
TOTAL/PERCENT	9,384	3.9	8,716	3.6	7,074	3.0	6,892	2.9	20,625	8.6	99,545	41.6	87,039	36.4	239,275

1/Primary and secondary school groups, college/university classes, other university personnel.

TABLE 37B: Number of collections reporting visitors in 1980, based on frequency distribution of visitors, according to discipline-area.

DISCIPLINE-AREA	FREQUENCY CLASSES (Number of Visitors) 1-19	20-39	40-59	60-79	80-99	100-119	120+
MAMMALOGY (N=127)	36	18	13	9	3	8	24
ORNITHOLOGY (N=114)	29	14	12	7	3	5	22
HERPETOLOGY (N=69)	31	14	2	6	2	2	9
ICHTHYOLOGY (N=92)	46	12	7	4	2	2	14
VERTEBRATE FOSSILS (N=55)	21	9	3	3	0	1	6
INVERTEBRATE FOSSILS (N=62)	18	12	6	3	0	1	6
INVERTEBRATES (N=75)	37	10	4	2	1	3	8
ENTOMOLOGY (N=176)	77	22	15	6	6	3	29
BOTANY (N=302)	114	45	24	14	8	16	47
MICROBIOLOGY (N=70)	33	5	2	1	1	1	5
TOTAL (N=1142)	442	161	88	55	26	42	170

TABLE 38: Number of collections providing visitor's research facilities to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	89	70.1	10	11.2	79	88.8
ORNITHOLOGY	114	87	76.3	10	11.5	77	88.5
HERPETOLOGY	69	56	81.2	5	8.9	51	91.1
ICHTHYOLOGY	92	79	85.9	12	15.2	67	84.8
VERTEBRATE FOSSILS	55	48	87.3	2	4.2	46	95.8
INVERTEBRATE FOSSILS	62	40	64.5	1	2.5	39	97.5
INVERTEBRATES	75	58	77.3	11	14.7	47	62.7
ENTOMOLOGY	176	129	73.3	13	10.1	116	89.9
BOTANY	302	226	74.8	20	8.8	206	91.2
MICROBIOLOGY	70	42	60.0	9	21.4	33	78.6
TOTAL/PERCENT	1142	854	74.8	93	10.9	761	89.1

TABLE 39: Number of collections providing access to specimens at the collection to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	95	74.8	15	15.8	80	84.2
ORNITHOLOGY	114	89	78.1	11	12.4	78	87.6
HERPETOLOGY	69	58	84.1	5	8.6	53	91.4
ICHTHYOLOGY	92	83	90.2	11	13.3	72	86.7
VERTEBRATE FOSSILS	55	42	76.4	1	2.4	41	97.6
INVERTEBRATE FOSSILS	62	44	71.0	4	9.1	40	90.9
INVERTEBRATES	75	53	70.7	7	13.2	46	86.8
ENTOMOLOGY	176	116	65.9	8	6.9	108	93.1
BOTANY	302	214	70.9	26	12.1	188	87.9
MICROBIOLOGY	70	34	48.6	6	17.6	26	76.5
TOTAL/PERCENT	1142	828	72.5	94	11.4	734	88.6

TABLE 40: Number of collections providing identification services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	98	77.2	18	18.4	80	81.6
ORNITHOLOGY	114	90	78.9	14	15.6	76	84.4
HERPETOLOGY	69	56	81.2	6	10.7	50	89.3
ICHTHYOLOGY	92	75	81.5	21	28.0	54	72.0
VERTEBRATE FOSSILS	55	46	83.6	6	13.0	40	87.0
INVERTEBRATE FOSSILS	62	39	62.9	3	7.7	36	92.3
INVERTEBRATES	75	54	72.0	17	31.5	37	68.5
ENTOMOLOGY	176	148	84.1	19	12.8	129	87.2
BOTANY	302	224	74.2	37	16.5	187	83.5
MICROBIOLOGY	70	36	51.4	13	36.1	23	63.9
TOTAL/PERCENT	1142	866	75.8	154	17.8	712	82.2

TABLE 41: Number of collections providing specimen preparation services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	57	44.9	18	31.6	39	68.4
ORNITHOLOGY	114	48	42.1	10	20.8	38	79.2
HERPETOLOGY	69	34	49.3	8	23.5	26	76.5
ICHTHYOLOGY	92	43	46.7	15	34.9	28	65.1
VERTEBRATE FOSSILS	55	26	47.3	7	26.9	19	73.1
INVERTEBRATE FOSSILS	62	18	29.0	4	22.2	14	77.8
INVERTEBRATES	75	26	34.7	6	23.1	20	76.9
ENTOMOLOGY	176	73	41.5	12	16.4	61	83.6
BOTANY	302	104	34.4	17	16.3	87	83.7
MICROBIOLOGY	70	28	40.0	11	39.3	17	60.7
TOTAL/PERCENT	1142	457	40.0	108	23.6	349	76.4

TABLE 42: Number of collections providing specimen storage/repository services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	57	44.9	12	21.1	45	78.9
ORNITHOLOGY	114	53	46.5	8	15.1	45	84.9
HERPETOLOGY	69	41	59.4	3	4.3	38	55.1
ICHTHYOLOGY	92	53	57.6	14	26.4	39	73.6
VERTEBRATE FOSSILS	55	24	43.6	7	29.2	17	70.8
INVERTEBRATE FOSSILS	62	22	35.5	1	4.5	21	95.5
INVERTEBRATES	75	35	46.7	7	20.0	28	80.0
ENTOMOLOGY	176	71	40.3	5	7.0	66	93.0
BOTANY	302	88	29.1	11	12.5	77	87.5
MICROBIOLOGY	70	25	35.7	8	32.0	17	68.0
TOTAL/PERCENT	1142	469	41.1	76	16.2	393	83.8

TABLE 43: Number of collections providing isolation of pure (living) culture services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	6	4.7	0	0.0	6	100.0
ORNITHOLOGY	114	7	6.1	0	0.0	7	100.0
HERPETOLOGY	69	4	5.8	0	0.0	4	100.0
ICHTHYOLOGY	92	3	3.3	0	0.0	3	100.0
VERTEBRATE FOSSILS	55	4*	7.3	0	0.0	4	100.0
INVERTEBRATE FOSSILS	62	2*	3.2	0	0.0	2	100.0
INVERTEBRATES	75	1	1.3	0	0.0	1	100.0
ENTOMOLOGY	176	13	7.4	0	0.0	13	100.0
BOTANY	302	40	13.2	6	15.0	34	85.0
MICROBIOLOGY	70	32	45.7	8	25.0	24	75.0
TOTAL/PERCENT	1142	112	9.8	14	12.5	98	87.5

*Respondents answered question incorrectly, probably noting "all services provided."

TABLE 44: Number of collections providing maintenance of genetic stocks services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	5	3.9	0	0.0	5	100.0
ORNITHOLOGY	114	6	5.3	0	0.0	6	100.0
HERPETOLOGY	69	5	7.2	0	0.0	5	100.0
ICHTHYOLOGY	92	2	2.2	0	0.0	2	100.0
VERTEBRATE FOSSILS	55	3*	5.5	0	0.0	3	100.0
INVERTEBRATE FOSSILS	62	1*	1.6	0	0.0	1	100.0
INVERTEBRATES	75	1	1.3	0	0.0	1	100.0
ENTOMOLOGY	176	15	8.5	0	0.0	15	100.0
BOTANY	302	26	8.6	2	7.7	24	92.3
MICROBIOLOGY	70	30	42.9	9	30.0	21	70.0
TOTAL/PERCENT	1142	94	8.2	11	11.7	83	88.3

*Respondents answered question incorrectly, probably noting "all services provided."

TABLE 45: Number of collections providing computer/data management services to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	24	18.9	7	29.2	17	70.8
ORNITHOLOGY	114	19	16.7	2	10.5	17	89.5
HERPETOLOGY	69	9	13.0	4	44.4	5	55.6
ICHTHYOLOGY	92	22	23.9	5	22.7	17	77.3
VERTEBRATE FOSSILS	55	7	12.7	0	0.0	7	100.0
INVERTEBRATE FOSSILS	62	5	8.1	1	20.0	4	80.0
INVERTEBRATES	75	10	13.3	6	60.0	4	40.0
ENTOMOLOGY	176	26	14.8	0	0.0	26	100.0
BOTANY	302	46	15.2	10	21.7	36	78.3
MICROBIOLOGY	70	12	17.1	0	0.0	12	100.0
TOTAL/PERCENT	1142	180	15.8	35	19.4	145	80.6

TABLE 46: Number of collections providing training services in collection management to outside users, according to discipline-area.

DISCIPLINE-AREA	N	NUMBER AVAILABLE N	%	FEES CHARGED Yes	%	No	%
MAMMALOGY	127	27	21.3	9	33.3	18	66.7
ORNITHOLOGY	114	32	28.1	9	28.1	23	71.9
HERPETOLOGY	69	15	21.7	0	0.0	15	100.0
ICHTHYOLOGY	92	19	20.7	2	10.5	17	89.5
VERTEBRATE FOSSILS	55	18	32.7	3	16.7	15	83.3
INVERTEBRATE FOSSILS	62	5	8.1	0	0.0	5	100.0
INVERTEBRATES	75	14	18.7	3	21.4	11	78.6
ENTOMOLOGY	176	34	19.3	4	11.8	30	88.2
BOTANY	302	56	18.5	5	8.9	51	91.1
MICROBIOLOGY	70	13	18.6	2	15.4	11	84.6
TOTAL/PERCENT	1142	233	20.4	37	15.9	196	84.1

TABLE 47: Respondents reporting different types of institutional publications maintained by them, according to discipline-area.

PUBLICATION TYPES	MAMMALOGY (N=127) N	%	ORNITHOLOGY (N=114) N	%	HERPETOLOGY (N=69) N	%	ICHTHYOLOGY (N=92) N	%	VERTEBRATE FOSSILS (N=55) N	%
Irregular Papers	45	35.4	41	36.0	20	29.0	42	45.7	27	49.0
Monographs	25	19.7	28	24.6	27	39.1	27	29.3	17	30.9
Nontechnical, Popular Articles or Books	26	20.5	32	28.1	19	27.5	27	29.3	25	45.5
Technical Periodicals	16	12.6	16	14.0	16	23.2	23	25.0	13	23.6
Type Catalogues	6	4.7	5	4.4	10	14.5	10	10.9	8	14.5
Other[1/]	9	7.1	7	6.1	5	7.2	13	14.1	8	14.5
No Response	67	52.8	58	50.9	34	49.3	36	39.1	14	25.5

[1/] Diagnostic manuals, established institutional "press", technical reports, newsletters, guidebooks, annual reports, annual proceedings, curatorial manuals.

TABLE 47 Continued: Respondents reporting different types of institutional publications maintained by them, according to discipline-area.

PUBLICATION TYPES	INVERTEBRATE FOSSILS (N=62) N	%	INVERTEBRATES (N=75) N	%	ENTOMOLOGY (N=176) N	%	BOTANY (N=302) N	%	MICROBIOLOGY (N=70) N	%
Irregular Papers	22	35.5	36	48.0	66	37.5	81	26.8	25	35.7
Monographs	20	32.3	29	38.7	33	18.8	35	11.6	14	20.0
Nontechnical, Popular Articles or Books	16	25.8	29	38.7	39	22.2	62	20.5	8	11.4
Technical Periodicals	10	16.1	29	38.7	29	16.5	34	11.3	19	27.1
Type Catalogues	8	12.9	16	21.3	12	6.8	10	3.3	3	4.3
Other[1/]	7	11.3	11	14.7	25	14.2	29	9.6	4	5.7
No Response	31	50.0	19	25.3	80	45.5	175	57.9	32	45.7

[1/] Diagnostic manuals, established institutional "press", technical reports, newsletters, guidebooks, annual reports, annual proceedings, curatorial manuals.

Priorities for Support of Systematics Resources

The types of resources most urgently needed in systematics collections are summarized in Table 48. This summary is based on a review of only those activities noted as "first priority" by individual respondents. Clearly, the most urgent needs for optimal use of collection facilities focus on more professional curatorial and technical personnel, either the first or second priority in each discipline-area. The third most commonly referenced resource needed was storage space. The first and second priorities appear to be correct, considering the low percentage of curatorial FTE coverage for collections (Tables 27A and 27B).

TABLE 48: Resources most urgently needed (expressed as a percent of respondents) for optimal use of collections, according to discipline-area (based on first priority expressed by respondents).

DISCIPLINE-AREA	NO RESPONSE	TYPE OF RESOURCE NEEDED: PERSONNEL: CURATORIAL	TECHNICAL	CLERICAL	POST DOCTORAL	GRAD. STUDENT	UNDER GRADUATE	HOURLY	NONPERSONNEL: EQUIPMENT	SUPPLIES	STORAGE SPACE	VISIT. FACIL.	OTHER[1/]
MAMMALOGY (N=127)	11.0	22.8	23.6	0.8	0.0	5.5	2.4	3.9	3.9	4.7	18.1	0.0	3.1
ORNITHOLOGY (N=114)	21.1	17.5	17.5	1.8	0.0	3.5	1.8	6.1	2.6	6.1	21.9	0.0	0.0
HERPETOLOGY (N=69)	14.5	18.8	23.2	0.0	0.0	8.7	4.3	5.8	5.8	2.9	14.5	0.0	1.4
ICHTHYOLOGY (N=92)	13.0	25.0	16.3	2.2	0.0	7.6	2.2	4.3	7.6	4.3	15.0	0.0	2.2
VERTEBRATE FOSSILS (N=55)	7.3	32.7	18.2	1.8	0.0	7.3	0.0	1.8	0.0	10.9	20.0	0.0	0.0
INVERTEBRATE FOSSILS (N=62)	14.5	38.7	6.5	3.2	1.6	3.2	4.8	4.8	0.0	3.2	16.1	0.0	3.2
INVERTEBRATES (N=75)	21.3	25.3	25.3	2.7	0.0	6.7	0.0	0.0	2.7	1.3	12.0	0.0	2.7
ENTOMOLOGY (N=175)	38.1	18.8	15.3	0.6	1.7	3.4	1.7	2.8	4.0	5.7	6.3	0.0	1.7
BOTANY (N=302)	27.2	18.9	16.2	3.3	0.7	2.6	4.3	6.3	4.3	1.5	11.4	0.7	2.6
MICROBIOLOGY (N=70)	42.7	2.4	31.7	0.0	0.0	3.7	1.2	1.2	6.1	4.9	3.7	0.0	2.4
AVG. %	21.1	22.1	19.4	1.6	0.4	5.2	2.3	3.7	3.7	4.6	13.9	0.0	1.9

[1/] Basic utility costs, computerization, volunteers, compactors, data processing, collection and cataloguing of material, storage cabinets, display units, new specimens.

SECTION 5: DEMOGRAPHY OF INDIVIDUAL RESEARCHERS

PRINCIPAL INDICATORS

1. A total of 1,912 (74.8%) of the 2,555 respondents hold doctorates, of which 60.3% were granted in 10 states: California, New York, Michigan, Illinois, Massachusetts, Kansas, Ohio, Florida, North Carolina, and Texas (Table 49).

2. Most doctoral degrees were granted to respondents between 1970 and 1974; in most discipline-areas the number awarded to respondents declined in subsequent years (Tables 51 and 52).

3. Nearly half (48.3%) of the systematic biologists chose their career on the basis of a "Key Personality," while 6.0% indicated "Career Opportunity" was a principal motivation (Table 54).

4. Of all systematists, 80.1% received formal training in systematics (Table 55); 31.2% were required to participate in a special field course in conjunction with their graduate programs (Table 56).

5. Overall, roughly 25% of the respondents spent some time at a terrestrial or marine field station during their graduate careers (Table 57).

6. A total of 1,516 respondents (59.3%) undertook field work in conjunction with their doctoral research; for every three respondents, one did field work in the United States and two did research in a foreign country (Table 58).

7. A total of 1,286 (50.0%) respondents visited museums in conjunction with research for the highest degree earned (master's or doctorate); 84.0% of those in Vertebrate Fossils visited museum collections in conjunction with their master's or doctoral degrees (Table 59).

8. The ten courses most commonly taken during graduate studies (in descending order, based on the percentage taking the course) are: foreign language, 84.6%; basic statistics, 74.0%; computer programming, 26.0%; public speaking, 25.4%; technical writing, 22.0%; electron microscopy, 17.7%; multivariate statistics, 17.2%; photography, 16.3%; scientific illustration, 13.7%; and electrophoresis, 8.2% (Table 60).

9. The languages most often taken by respondents to satisfy language requirements for their highest degree earned are: German (65.4%), French (60.0%), and Spanish (16.0%); 10.2% of the respondents satisfied a language requirement by demonstrating a proficiency with computers (Table 61).

10. Seventy-seven percent of the respondents indicated they were dependent upon some financial support to complete their graduate studies (Table 63); research assistantships (grant and institutional) were held by 43.6% of the respondents while working on their doctorates (Table 62B).

11. Of all respondents, 84.9% are established professionals (Table 6); 15.3% are employed by museums and 64.0% by colleges or universities (Table 64).

12. The modal salary range of all respondents is $25,001 to $30,000 per year (Table 66).

13. Nearly 70% of the respondents indicated their career goal was to do research in colleges or universities (Table 70); about 6% expressed exclusive interest in applied research (Table 71).

14. Systematic biologists work an average of 46.8 hours per week; 41.1% of their time is devoted to research and 21.0% to teaching (Table 74).

15. The majority (80.1%) of systematists continue to work in the same discipline in which they received their highest degree; 40.7% changed the focus of their research to another taxonomic group and 61.5% of systematists work on inter-specific studies (Tables 76 and 77).

16. About 50% of the systematists surveyed depend upon the use of collections in other institutions in their research programs (Table 81).

17. The number of master's level students under the direction of respondents decreased from 1,779 to 1,552 (12.8%) between the 1980-1981 and 1981-1982 school years (Table 82).

18. Between 23% and 29% of the vertebrate zoologists responding have applied for and received permits to work on endangered species; about 10% of the botanists report having permits to work on endangered species (Table 84).

19. Between 1977 and 1982, 88.8% of the respondents published over 20,000 peer-reviewed papers (Table 86) and 27.1% published a book (Table 87). Also, 92.5% of the respondents reported publishing a paper during their career (Table 88).

20. According to respondents, priorities for funding under the NSF Systematic Biology Program are, in rank order: 1) research resulting in taxonomic revisions or monographs; 2) floral or faunal surveys; 3) organismic characterizations using a variety of techniques but without an immediate intent to revise taxonomic relationships; 4) collaborative research; and 5) predoctoral research programs (Table 89A).

21. According to respondents, priorities for funding under the NSF Biological Research Resources Program are, in rank order: 1) collection management personnel; 2) computerization of specimen data; 3) updating and revising specimen data; 4) reorganization of collections; and 5) renovation or construction of collection facilities (Table 93).

Educational Background of Systematists

Of the 1,912 doctoral degrees received by respondents, 1,153 (60.3%) were granted in 10 states: California (290), New York (152), Michigan (125), Illinois (122), Massachusetts (90), Kansas (81), Ohio (75), Florida (74), North Carolina (72), and Texas (72) (Table 49). A total of 1,664 master's degrees

were reported, with 892 (53.6%) being awarded in the same 10 states. Bachelor's degrees awarded to respondents follow a similar pattern, except that Pennsylvania (80) ranks seventh and North Carolina does not rank in the top ten states.

When viewed on a discipline-area basis (Table 50), most doctoral and master's degrees in each field were granted in only a few states. California is highest in granting both doctoral and master's degrees in all discipline-areas except Vertebrate Fossils, where most doctorates were granted in Michigan.

The year in which doctoral and master's degrees were awarded to respondents provides insights into the productivity of personnel in systematics as well as some indication of the relative "academic age" of respondents (Table 51). Most doctoral degrees were granted between 1970 and 1974, while most master's degrees were granted between 1975 and 1979. Of greater importance is the fact that the number of doctorates granted decreased between 1975 and 1979 in comparison to the previous five-year period. On a discipline-area basis (Table 52), this trend is substantiated by the number of doctoral degrees granted in either the 1975-1979 or the 1970-1974 frequency class being less than the number awarded in the preceeding class. Master's degrees awarded follow a similar pattern.

State colleges and universities are the primary source of degrees according to respondents, who were granted 1,562 bachelor's (64.4%; N=2,425), 1,531 master's (79.9%; N=1,915), and 1,502 doctoral degrees (76.9%; N=1,954) from such institutions (Table 53). There is an increase in the number of doctorates granted from private colleges or universities in comparison to the number of master's degrees awarded. A significant number (33.5%; 814) of the respondents received their bachelor's degrees from private colleges or universities.

The motivations that caused respondents to enter a specific discipline-area in systematic biology (Table 54) are the influence of a "Key Personality" (48.3% of respondents); "Key Courses" (31.8%); and a "Hobby" (29.9%). With the exception of Ornithology and "Other," between 15% and 27% of the respondents had some undergraduate research experience that influenced their decision to enter their chosen field. Overall, 6.0% of the respondents indicated they were influenced by "Career Opportunity."

Overall, most respondents (80.1%) have received training in systematics, either in a formal class or seminar (Table 55). In Botany, over 92% indicated they had received such training. The lowest percentages that have received training in systematics are in "Other" (54.8%), Microbiology (54.7%), and Invertebrates (68.0%).

Slightly less than one-third (31.2%) of the respondents were required to participate in a special field course to receive their highest degree (Table 56). The discipline-areas with the highest percentages of respondents required to participate in a special field course are Vertebrate Fossils (59.5%) and Invertebrate Fossils (51.1%).

In reviewing the actual field experience reported by respondents (Table 57), between 23% and 24% have had experience at a terrestrial or marine field station, and about 22% have participated in a noncredit expedition in the United States or in a foreign country. Respondents could indicate more than one type of field experience. Within each discipline-area, the ratio of total number of respondents to the number of field experiences was calculated. This ratio ranged from 1:0.38 in Microbiology to 1:2.31 in Ichthyology, with most discipline-areas reflecting a ratio of 1:1.8 to 1:1.9. This indicates that respondents tended to have two field experiences during their graduate careers. Less than 5% of the respondents indicated they had participated in the Organization for Tropical Studies (OTS) program in Costa Rica.

Slightly over 20% of the respondents undertook field work in the United States in conjunction with their doctoral research, while nearly 40% undertook field work in a foreign country (Table 58). A relatively small percent of the respondents indicated that they undertook field work in conjunction with their master's research (about 3% in United States, 11% in a foreign country). The highest percentages of respondents undertaking field work at the doctoral level were in Botany and Invertebrate Fossils, where 45.8% and 46.8%, respectively, were in the field in a foreign country.

Comparable figures were reported for respondents concerning visits to museums in conjunction with master's and doctoral research programs; 11.7% of respondents visited American museums and 38.7% visited foreign museums (Table 59). Of those visiting museums in conjunction with their doctoral research, nearly

19% in Vertebrate Fossils visited American museums and nearly 49% visited foreign museums. Also, a relatively large percent of those in Mammalogy, Botany, and Entomology visited museums in the United States and abroad in conjunction with their doctoral research programs.

Overall, of the methodological courses taken by respondents during graduate studies (Table 60), the 10 most common are (in decreasing order of percentages of respondents): foreign language (84.6%), basic statistics (74.0%), computer programming (26.0%), public speaking (25.4%), technical writing (22.0%), electron microscopy (17.7%), multivariate statistics (17.2%), photography (16.3%), scientific illustration (13.7%), and electrophoresis (8.2%).

Of the 10 courses most commonly taken during graduate studies, half are directed toward communication skills (foreign language, public speaking, technical writing, scientific illustration, and photography), while the other half enhance research skills (basic statistics, computer programming, electron microscopy, multivariate statistics, and electrophoresis). Of importance is the fact that many technical courses that would enhance the research skills of the respondents (gas chromatography, remote sensing, telemetry, data base management, etc.) were taken by very small percentages of the respondents (Table 60).

While a foreign language course is the one most often taken by respondents (85.1%), this probably is a reflection of language requirements in degree programs. Table 61 summarizes the foreign languages and other research skills that respondents used to satisfy language requirements for their highest degree. In reviewing these data, two important observations can be made. Most respondents satisfied degree requirements by showing some proficiency in more than one foreign language. German, French, and Spanish were the most common languages referenced (65.4%, 60.0%, and 16.0%, respectively). Other languages (Russian, Chinese, Latin, etc.) were cited by less than 3% of the respondents. Lastly, a relatively large number of people (over 10%) satisfied their language requirements by showing some proficiency with computers, the majority citing programming.

Graduate educations of respondents were financed primarily through teaching assistantships at both the master's (44.8%) and doctoral (49.8%) levels

(Tables 62A and 62B). Institutional and grant supported research assistantships were also significant sources of monies, with 23.3% of the respondents having such support at the master's level and 43.6% at the doctoral level. Scholarships were reported as a financial source by 21.4% of the respondents at the doctoral level and 11.3% at the master's level. Of note is the fact that curatorial assistantships were significant sources of support for individuals in the vertebrate discipline-areas, especially Vertebrate Fossils (averaging 20% of respondents in doctoral programs).

Overall, 77.0% of the respondents indicated that they were dependent upon the financial support they had received in order to complete their graduate studies (Table 63).

TABLE 49: Number of degrees granted respondents according to state.

DEGREE	STATE AL	AK	AR	AZ	CA	CO	CT	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY
PRE-COLLEGE	8	0	7	1	89	7	10	2	0	10	5	1	11	4	33	12	11	5
BACHELOR'S	21	0	12	16	258	40	31	3	1	46	15	9	46	11	103	49	58	21
MASTER'S	23	5	13	28	193	30	34	4	6	71	12	13	28	11	113	35	66	14
DOCTORAL	11	2	9	31	290	17	45	11	3	74	19	13	39	6	122	37	81	8

TABLE 49 Continued: Number of degrees granted respondents according to state.

DEGREE	STATE LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
PRE-COLLEGE	9	20	11	10	29	11	21	3	0	11	0	8	6	26	2	2	59	45
BACHELOR'S	27	73	17	13	106	36	45	8	6	35	12	22	15	42	11	6	135	117
MASTER'S	35	66	14	7	105	23	24	6	6	42	7	13	9	18	14	4	78	73
DOCTORAL	33	90	26	4	125	37	21	3	4	72	12	14	10	14	12	2	152	75

TABLE 49 Continued: Number of degrees granted respondents according to state.

DEGREE	STATE OK	OR	PA	PR	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	FRGN	TOTAL
PRE-COLLEGE	5	17	21	1	1	5	4	15	20	12	10	1	8	12	1	0	1	623
BACHELOR'S	25	38	80	0	11	14	7	26	85	52	28	7	34	42	11	3	9	1938
MASTER'S	27	34	32	3	5	14	11	20	85	43	33	3	43	37	14	12	5	1664
DOCTORAL	30	45	20	2	5	13	2	37	72	22	28	1	60	38	5	2	6	1912

TABLE 50: Distribution of degrees granted respondents according to state, by discipline-area.

DISCIPLINE-AREA/(N)/DEGREE	AL	AK	AR	AZ	CA	CO	CT	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH	OK	OR	PA	PR	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	FRGN
MAMMALOGY (N=166)																																																					
Pre-College					3	1	1	1					1		2		4			1			1	1	2			1		1	2	2			8			1	3					7		1	1						
Bachelor's	1			3	14	5	5			1			4		10	2	11		4	4		1	5	2	1			2	1	4		3			13	2	3	1	5			1			9	1	4		4	2	1		
Master's	1			2	11	1	4						2		13		10		2	6		1	9		1		1	1					4		6		3	4	3			1		1	16	2	2		2	1		1	
Doctoral	1			2	19		5			2			2		16		13		1	4	1	1	11	1			1	1					6		9		2	3	2				1		11	1	1	1		1		1	
ORNITHOLOGY (N=78)																																																					
Pre-College					3								1	1				1		2			2					1				1		1	1			3															
Bachelor's					5	2	2			1		1	2	1	1		1	1		4	2	1	9	2				2		1		2	1	1	3	4		1	2		1				1		1	1			1		
Master's					5	2	1			1		1	1	2	2		1		3	1		1	8							1					1	3	1				1				3	1		1	2				
Doctoral			1		12	1	3			4		1			2		3		5	4			4	1								2			4	2	2					2			1	1			3	2	1		
HERPETOLOGY (N=258)																																																					
Pre-College			3		19						2		1		1	1	1	1	2	3	1		2		5			3		2		4			8	7	1	1	4			1	1		5				2	1			1
Bachelor's			2	3	28	1	3			9	2		1		18	6	6	1	7	5			7	1	7	1		2		2	3	5	1	1	15	12	3	5	7			2	2	1	15	2	4	1	2	2	1		2
Master's		1	3	5	24	4	3			13	1		1		10	3	5		5	2			10		3			3				2	2		7	6	5	5	6				3	3	15	3	1	1	1	1	1		1
Doctoral			2	5	30	6	1	1		10					15	1	10	1	10	2			13	1	1	1		3		1		3	5		10	5	3	8				2		6	13	3	1		2	1			2
ICHTHYOLOGY (N=180)																																																					
Pre-College	1				7					1	1				4		1		1		1		3		2										4	2	1	3						1	2		3			1			
Bachelor's	3		2	1	27	4	2			5	3	3	4	1	8		1	2	1	5	2		8	1	5	1						1	2	1	11	2	3	7	6		2	1		3	3	2	4	1	1	6			1
Master's	9	1	1	1	25	3	1			12	1	1	1		11	2	1	2	3	3		2	5		2		1	2					1	1	7	1	3	6	1			1		1	4	3	9		1	2			
Doctoral	3			3	26	1	4	2		10	3	3	3		5		2	1	2	5	1	1	6	3	1		2	3					1		15	2	7	4	1					1	4	1	4		8	1			
VERTEBRATE FOSSILS (N=74)																																																					
Pre-College					1	1							1				2		1	1		1	2												3	1														1			
Bachelor's				1	6	1		1		1				1	3		2		1	1			7	1				1		3		6	3		2	2		1	1						4	2				2			
Master's			1	1	9	1	2			2			1		3		1		2	1			6							1		1	1		6								4		2			1		1		2	
Doctoral			1		7		3			2			1	1	2		2		1	5			11											1		5	1									3	1						1
INVERTEBRATE FOSSILS (N=47)																																																					
Pre-College					2										2		1			1	1		1	1											2																		
Bachelor's					7	1	1								4	1	1			2				1	3										3	3	1		4						1	1			1				
Master's					6		2								1	1	3		1	4					2	1				1		1			4	1								1	1					1			
Doctoral					7		1						1		5	1	3			5			1		1				1	2					2	2	1		1						1				1				
INVERTEBRATES (N=385)																																																					
Pre-College	2		1		12	2	4			1	1	1	2	1	7	2			1	4	3	4	4		1	1		2			1	6			7	12	1	5	1	1	1	2	2	3	6	2	2		1	2			
Bachelor's	6		1		28	10	9			9	1	1	5	1	16	5	5	4	7	19	5	6	13	3	5	3	3	6	3	1	4	7		1	16	18	2	7	12		3	3	2	4	11	8	5		8	6	2		1
Master's	3	1	1		25	5	8		1	18	2	3	5	1	21	5	3	6	10	10	3	3	11		3	2	3	9		1	3	2			8	10	2	6	6	2	1	4	2	4	7	5	8		11	9	4	1	1
Doctoral	3	1		6	42	4	9	4	2	21	1	3	5	1	18	7	6	3	11	14	2	2	9	1	2			20		3	4	1		1	19	13	3	3	2		3	4	1	5	13	4	3		12	4		1	1
ENTOMOLOGY (N=501)																																																					
Pre-College	2		1	1	15	1	3			1					7	2				3	1	2		5	4			1		2		1			5	6		1	4			1	1	1	3	5	1			1			
Bachelor's	5		3	1	71	6	7			8	4	1	10		14	14	10	3	1	14	4	3	19	7	8	1		6	3	3	1	4		1	27	28	4	5	19		2	2	1	4	18	17	2		3	6	2		
Master's	5	1	5	6	35	6	8	2	2	16	4	2	5	1	20	3	18		3	10	5		20	7	7		1	7	4	4	2	2	1	1	9	21	6	5	6			3	1	1	15	17	6		4	4	1	1	
Doctoral	3	1	3	5	54	1	11	2		13	8	2	5	2	25	6	27	1	1	18	8		13	11	4			10	5	3	1	2			38	24	4	5	7			1		2	11	6	8		4	4		1	
BOTANY (N=730)																																																					
Pre-College	3		2		25	2	2	1		6	1		3	2	7	6	2	3	3	4	3	1	13	3	5	2		3		3	3	9	2	1	20	13	2	3	7			1		3	4	4	3	1	5	6	1		
Bachelor's	6		4	5	62	9	1	2	1	10	4	3	19	7	27	19	17	10	5	16	2	1	31	13	10	2	2	14	5	6	5	11	3	1	35	38	8	10	21		3	4	2	14	19	16	6	4	14	16	4	3	3
Master's	5	1	2	11	51	6	5	1	3	7	3	6	11	7	27	17	21	6	6	27	6		32	13	5	3		19	3	3	3	9	3	2	22	28	6	6	8		3	5		9	15	10	4		21	16	8	6	3
Doctoral	1		1	9	77	4	7	1	1	11	6	4	22	1	26	20	13	2	2	29	11		53	16	11	2	1	34	6	3	2	5			49	18	6	19	5	1	2	4		11	27	4	6	1	25	19	3		1
MICROBIOLOGY (N=53)																																																					
Pre-College					1										1									1	2							1			1	1			1														
Bachelor's				1	4						1		1		1	1				1	1			3	2		1			2	1	2			3	2			1						3		1		1	1			1
Master's				1									1			2				1			1	2	1					2					1	3							1		3		1		1	1			
Doctoral				1	8			1							2	1	1			3	3		2	2	1					2	1				1	4		1									2		3	6			1
OTHER (N=82)																																																					
Pre-College					1					1			2		2	1			1	1	1	2	1									2				3		1	1														
Bachelor's				1	6	1	1			2					1	1	4		1	2	1	1	7	2	4			2			1	1	1		7	6	1	1	2			1			1	3	1			1			1
Master's				1	2	2		1		2	1				5	2	3			1			3	1				1			1	1	2		7		1	2	2						4	2	2			1		1	
Doctoral			1		8		1			1	1			1	6	1	1			1			2	1				1			2	1			5		1	2	2	1				1	1		2		1	1			1

TABLE 51: Pooled distribution of degrees granted according to year frequency classes (mode of each degree bolded).

	YEAR FREQUENCY CLASSES										
DEGREE	< 1934	1935-1939	1940-1944	1945-1949	1950-1954	1955-1959	1960-1964	1965-1969	1970-1974	1975-1979	> 1980
Pre-College	36	38	46	75	72	103	132	134	96	13	1
Bachelor's	51	61	89	117	198	214	325	**391**	331	230	23
Master's	34	35	34	84	152	135	206	291	273	**303**	137
Doctoral	25	25	40	52	138	148	229	346	**355**	332	214

TABLE 52: Distribution of degrees granted according to year granted, by discipline-area.

DISCIPLINE-AREA/(N)/DEGREE	YEAR FREQUENCY CLASSES										
	< 1934	1935-1939	1940-1944	1945-1949	1950-1954	1955-1959	1960-1964	1965-1969	1970-1974	1975-1979	> 1980
MAMMALOGY (N=166)											
Pre-College	2	2	5	2	5	9	11	6	6	2	0
Bachelor's	3	4	8	7	6	13	26	26	26	16	0
Master's	1	3	5	6	5	8	8	22	19	22	13
Doctoral	0	2	2	4	9	8	15	15	28	27	13
ORNITHOLOGY (N=78)											
Pre-College	2	0	1	3	3	1	4	3	2	0	0
Bachelor's	1	3	2	5	4	8	13	9	10	4	0
Master's	0	0	0	1	5	7	6	11	5	6	3
Doctoral	1	0	2	3	3	6	7	14	11	10	0
HERPETOLOGY (N=259)											
Pre-College	1	3	7	6	6	13	15	20	14	3	1
Bachelor's	0	2	8	15	14	15	37	32	36	39	3
Master's	1	0	2	9	12	9	16	31	23	41	16
Doctoral	0	1	2	1	16	11	12	36	31	32	29
ICHTHYOLOGY (N=180)											
Pre-College	0	2	1	2	4	7	13	11	4	1	0
Bachelor's	0	0	5	6	9	14	25	42	26	18	3
Master's	0	0	1	5	8	5	15	32	24	29	10
Doctoral	0	0	0	1	2	7	8	21	31	32	16

TABLE 52 Continued: Distribution of degrees granted according to year granted, by discipline-area.

DISCIPLINE-AREA/(N)/DEGREE	YEAR FREQUENCY CLASSES										
	< 1934	1935-1939	1940-1944	1945-1949	1950-1954	1955-1959	1960-1964	1965-1969	1970-1974	1975-1979	> 1980
VERTEBRATE FOSSILS (N=74)											
Pre-College	2	0	0	1	0	3	4	3	3	1	0
Bachelor's	2	1	0	2	5	3	8	15	14	7	0
Master's	1	0	2	1	1	3	7	9	6	16	6
Doctoral	0	2	1	1	3	3	3	10	11	7	8
INVERTEBRATE FOSSILS (N=47)											
Pre-College	1	0	0	1	2	1	1	5	0	0	0
Bachelor's	2	0	0	6	5	4	6	6	7	2	0
Master's	0	1	1	1	9	2	6	5	1	5	1
Doctoral	2	0	1	4	5	2	10	7	4	2	0
INVERTEBRATES (N=385)											
Pre-College	7	6	10	18	11	14	23	17	14	0	0
Bachelor's	8	11	12	18	37	33	44	69	46	28	1
Master's	5	9	3	12	27	24	36	43	47	38	12
Doctoral	4	5	9	4	20	24	38	60	63	51	26
ENTOMOLOGY (N=501)											
Pre-College	12	10	8	17	13	14	24	21	21	3	0
Bachelor's	15	18	17	21	44	37	51	65	59	58	8
Master's	8	9	4	19	28	21	35	43	56	55	40
Doctoral	7	4	10	10	25	30	51	60	55	57	49
BOTANY (N=730)											
Pre-College	8	11	13	22	20	38	32	41	29	3	0
Bachelor's	20	19	34	32	58	67	96	100	98	55	7
Master's	18	12	13	23	45	44	62	80	85	87	35
Doctoral	11	11	12	21	47	48	68	103	99	102	69
MICROBIOLOGY (N=53)											
Pre-College	0	1	1	3	4	2	0	3	1	0	0
Bachelor's	0	0	1	3	8	11	8	5	2	1	0
Master's	0	0	0	1	6	5	6	4	0	2	1
Doctoral	0	0	0	0	4	6	12	15	9	3	1
OTHER (N=82)											
Pre-College	1	3	0	0	4	1	5	4	2	0	0
Bachelor's	0	3	2	2	8	9	11	22	7	2	1
Master's	0	1	3	6	6	7	9	11	7	2	0
Doctoral	0	0	1	3	4	3	5	5	13	9	3

TABLE 53: Type of institutions that awarded respondents' degrees, according to discipline-area.

DISCIPLINE-AREA	State			Private			City			Federal		
	BA/BS	MA/MS	PhD	BA/BS	MA/MS	PhD	BA/BS	MA/MS	PhD	BA/BS	MA/MS	PhD
MAMMALOGY (N=166)	105	108	102	57	22	25	3	2	2	1	1	0
ORNITHOLOGY (N=78)	47	47	56	26	5	9	1	0	0	0	0	0
HERPETOLOGY (N=259)	165	159	142	81	26	28	4	1	2	1	1	1
ICHTHYOLOGY (N=180)	118	111	96	60	35	46	2	0	3	0	0	0
VERTEBRATE FOSSILS (N=74)	49	44	32	21	15	19	0	0	0	0	0	0
INVERTEBRATE FOSSILS (N=47)	19	23	26	23	12	12	2	2	1	1	0	0
INVERTEBRATES (N=385)	220	215	222	148	82	89	6	2	5	3	1	1
ENTOMOLOGY (N=501)	309	291	276	110	30	48	4	0	0	3	1	2
BOTANY (N=730)	453	461	476	242	116	126	10	4	6	6	5	5
MICROBIOLOGY (N=53)	30	28	41	21	6	8	0	1	0	0	0	0
OTHER (N=82)	47	44	33	25	14	14	1	0	0	1	0	0
TOTAL	1562	1531	1502	814	363	424	33	12	19	16	9	9

TABLE 54: Motivations for entering a discipline in systematic biology, according to discipline-area.*

DISCIPLINE-AREA	HOBBY N	HOBBY %	KEY PERSONALITY N	KEY PERSONALITY %	KEY COURSES N	KEY COURSES %	UNDERGRADUATE RESEARCH EXPERIENCE N	UNDERGRADUATE RESEARCH EXPERIENCE %	CAREER OPPORTUNITY N	CAREER OPPORTUNITY %	OTHER N	OTHER %
MAMMALOGY (N=166)	40	24.10	91	54.82	55	33.13	27	16.27	8	4.82	11	6.63
ORNITHOLOGY (N=78)	38	48.72	38	48.72	16	20.51	8	10.26	2	2.56	6	7.69
HERPETOLOGY (N=259)	127	49.03	111	42.86	66	25.48	53	20.46	4	1.54	34	13.13
ICHTHYOLOGY (N=180)	55	30.56	85	47.22	49	27.22	41	22.78	9	5.00	29	16.11
VERTEBRATE FOSSILS (N=74)	21	28.38	36	48.65	23	31.08	20	27.03	2	2.70	10	13.51
INVERTEBRATE FOSSILS (N=47)	17	36.17	19	40.43	19	40.43	13	27.66	3	6.38	3	6.38
INVERTEBRATES (N=385)	88	22.86	184	47.79	99	25.71	77	20.00	30	7.79	73	18.96
ENTOMOLOGY (N=501)	199	39.72	228	45.51	145	28.94	103	20.56	36	7.19	67	13.37
BOTANY (N=730)	157	21.51	401	54.93	308	42.19	115	15.75	42	5.75	125	17.12
MICROBIOLOGY (N=53)	7	13.21	18	33.96	11	20.75	8	15.09	8	15.09	17	32.08
OTHER (N=82)	15	18.29	22	26.83	21	25.61	9	10.98	10	12.20	12	14.63
TOTAL/PERCENT (N=2555)	764	29.90	1233	48.25	812	31.78	474	18.55	154	6.02	387	15.14

* A respondent could indicate more than one "motivation."

TABLE 55: Degree to which respondents have received formal training in systematic biology, by discipline-area.

DISCIPLINE-AREA	TRAINING RECEIVED N	%	CLASSROOM INSTRUCTION N	%	SEMINARS N	%
MAMMALOGY (N=166)	133	80.12	127	76.51	100	60.24
ORNITHOLOGY (N=78)	61	78.21	59	75.64	51	65.38
HERPETOLOGY (N=259)	201	77.61	182	70.27	150	57.92
ICHTHYOLOGY (N=180)	139	77.22	135	75.00	109	60.56
VERTEBRATE FOSSILS (N=74)	31	86.49	29	81.08	27	75.68
INVERTEBRATE FOSSILS (N=47)	37	78.72	35	74.47	26	55.32
INVERTEBRATES (N=385)	262	68.05	232	60.26	191	49.61
ENTOMOLOGY (N=501)	435	87.00	427	85.40	337	67.40
BOTANY (N=730)	674	92.33	666	91.23	538	73.70
MICROBIOLOGY (N=53)	29	54.72	27	50.94	15	28.30
OTHER (N=82)	45	54.88	43	52.44	24	29.27
TOTAL/PERCENT (N=2555)	2047	80.11	1962	76.79	1568	61.36

TABLE 56: Degree to which respondents were required to participate in a special field course to receive their highest degree, according to discipline-area.

DISCIPLINE-AREA	REQUIRED FIELD COURSE N	%
MAMMALOGY (N=166)	55	33.13
ORNITHOLOGY (N=78)	34	43.59
HERPETOLOGY (N=259)	75	28.96
ICHTHYOLOGY (N=180)	57	31.67
VERTEBRATE FOSSILS (N=74)	44	59.46
INVERTEBRATE FOSSILS (N=47)	24	51.06
INVERTEBRATES (N=385)	144	37.40
ENTOMOLOGY (N=501)	132	26.35
BOTANY (N=730)	201	27.50
MICROBIOLOGY (N=53)	8	15.09
OTHER (N=82)	23	28.05
TOTAL/PERCENT (N=2555)	797	31.19

TABLE 57: Types of field activities in which respondents participated during their graduate careers.*

DISCIPLINE-AREA	FIELD ACTIVITY																	
	ORGANIZATION FOR TROPICAL STUDIES		FIELD STATION: MARINE		FIELD STATION: TERREST.		FIELD STATION: AQUATIC		RESEARCH VESSEL		MUSEUM/ UNIVERSITY COURSE		EXPEDITION: COLLEGE CREDIT		EXPEDITION: U.S. (NO CRED)		EXPEDITION: FOREIGN (NO CRED)		OTHER	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
MAMMALOGY (N=166)	14	8.43	36	21.69	39	23.49	5	3.01	11	6.63	45	27.11	28	16.87	49	29.52	65	39.16	20	12.05
ORNITHOLOGY (N=78)	5	6.41	19	24.36	26	33.33	2	2.56	2	2.56	21	26.92	16	20.51	25	32.05	22	28.21	4	5.13
HERPETOLOGY (N=259)	15	5.79	32	12.36	90	34.75	22	8.49	17	6.56	49	18.92	37	14.29	86	33.20	68	26.25	29	11.20
ICHTHYOLOGY (N=180)	6	3.33	94	52.22	26	14.44	46	25.56	88	48.89	27	15.00	19	10.56	48	26.67	38	21.11	25	13.89
VERTEBRATE FOSSILS (N=74)	1	1.35	5	6.76	11	14.86	0	0.00	6	8.11	36	48.65	21	28.38	21	28.38	35	47.30	7	9.46
INVERTEBRATE FOSSILS (N=47)	0	0.00	24	51.06	6	12.77	1	2.13	6	12.77	23	48.94	7	14.89	10	21.28	17	36.17	6	12.77
INVERTEBRATES (N=385)	12	3.12	221	57.40	69	17.92	61	15.84	120	31.17	80	20.78	36	9.35	61	15.84	36	9.35	44	11.43
ENTOMOLOGY (N=501)	19	3.80	35	7.00	143	28.60	56	11.20	7	1.40	104	20.80	49	9.80	107	21.40	141	28.20	70	14.00
BOTANY (N=730)	45	6.16	96	13.13	192	26.27	56	7.66	48	6.57	136	18.60	87	11.90	153	20.93	150	20.52	137	18.74
MICROBIOLOGY (N=53)	0	0.00	2	3.77	3	5.66	1	1.89	2	3.77	1	1.89	3	5.66	0	0.00	2	3.77	6	11.32
OTHER (N=82)	4	4.88	25	30.49	11	13.41	13	15.85	14	17.07	10	12.20	5	6.10	1	1.22	8	9.76	11	13.41
TOTAL/PERCENT (N=2555)	121	4.73	589	23.05	616	24.10	263	10.29	321	12.56	532	20.82	308	12.05	561	21.95	582	22.77	359	14.05

* Respondents could indicate more than one field activity.

TABLE 58: Degree to which respondents undertook field work in conjunction with research while working on highest degree earned, by discipline-area.

DISCIPLINE-AREA	FIELD WORK IN: UNITED STATES BA N	BA %	MA N	MA %	PhD N	PhD %	GEN N	GEN %	FOREIGN COUNTRY BA N	BA %	MA N	MA %	PhD N	PhD %	GEN N	GEN %
MAMMALOGY (N=166)	2	1.20	3	1.81	38	22.89	6	3.61	0	0.00	19	11.45	66	39.76	20	12.05
ORNITHOLOGY (N=78)	2	2.56	2	2.56	27	34.62	6	7.69	2	2.56	6	7.69	28	35.90	9	11.54
HERPETOLOGY (N=259)	3	1.16	15	5.79	63	24.32	10	3.86	5	1.93	30	11.58	94	36.29	37	14.29
ICHTHYOLOGY (N=180)	0	0.00	3	1.67	36	20.00	6	3.33	1	0.56	23	12.78	68	37.78	27	15.00
VERTEBRATE FOSSILS (N=74)	0	0.00	2	2.70	11	14.86	3	4.05	2	2.70	13	17.57	29	39.19	12	16.22
INVERTEBRATE FOSSILS (N=47)	0	0.00	1	2.13	11	23.40	3	6.38	1	2.13	3	6.38	22	46.81	10	21.28
INVERTEBRATES (N=385)	0	0.00	12	3.12	65	16.88	13	3.38	2	0.52	40	10.39	150	38.96	52	13.51
ENTOMOLOGY (N=501)	0	0.00	13	2.59	81	16.17	20	3.99	1	0.20	61	12.18	189	37.72	82	16.37
BOTANY (N=703)	7	0.96	17	2.33	177	24.25	26	3.56	4	0.55	75	10.27	334	45.75	99	13.56*
MICROBIOLOGY (N=53)	0	0.00	4	7.55	1	1.89	0	0.00	0	0.00	0	0.00	7	13.21	0	0.00
OTHER (N=82)	0	0.00	3	3.66	4	4.88	2	2.44	1	1.22	11	13.41	15	18.29	10	12.20
TOTAL/PERCENT (N=2555)	14	0.54	75	2.93	514	20.11	95	3.71	19	0.74	281	10.99	1002	39.21	358	14.01

* Total exceeds number of respondents for discipline-area, due to multiple responses.

TABLE 59: Degree to which respondents visited museums in conjunction with research while working on highest degree earned, by discipline-area.

DISCIPLINE-AREA	MUSEUMS IN: UNITED STATES BA N	BA %	MA N	MA %	PhD N	PhD %	GEN N	GEN %	FOREIGN COUNTRY BA N	BA %	MA N	MA %	PhD N	PhD %	GEN N	GEN %
MAMMALOGY (N=166)	0	0.00	0	0.00	23	13.86	4	2.41	0	0.00	14	8.43	69	41.57	19	11.45
ORNITHOLOGY (N=78)	0	0.00	2	2.56	8	10.26	5	6.41	3	3.85	3	3.85	26	33.33	12	15.38
HERPETOLOGY (N=259)	1	0.39	7	2.70	17	6.56	4	1.54	2	0.77	27	10.42	62	23.94	29	11.20
ICHTHYOLOGY (N=180)	0	0.00	1	0.56	22	12.22	8	4.44	2	1.11	18	10.00	65	36.11	24	13.33
VERTEBRATE FOSSILS (N=74)	0	0.00	2	2.70	14	18.92	2	2.70	1	1.35	10	13.51	36	48.65	10	13.51*
INVERTEBRATE FOSSILS (N=47)	0	0.00	1	2.13	8	17.02	1	2.13	1	2.13	3	6.38	19	40.43	10	21.28
INVERTEBRATES (N=385)	0	0.00	1	0.26	23	5.97	6	1.56	1	0.26	15	3.90	91	23.64	30	7.79
ENTOMOLOGY (N=501)	1	0.20	5	1.00	55	10.98	12	2.40	1	0.20	40	7.98	187	37.33	72	14.37
BOTANY (N=730)	1	0.14	5	0.68	103	14.11	17	2.33	0	0.00	35	4.79	255	34.93	69	9.45
MICROBIOLOGY (N=53)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
OTHER (N=82)	0	0.00	0	0.00	0	0.00	1	1.22	1	1.22	5	6.10	9	10.98	4	4.88
TOTAL/PERCENT (N=2555)	3	0.11	24	0.93	273	10.68	60	2.34	12	0.46	170	6.65	819	32.05	279	10.91

* Total exceeds number of respondents for discipline-area, due to multiple responses.

TABLE 60: Methodological courses taken by respondents, according to discipline-area.

METHODOLOGICAL COURSES	MAMMALOGY (N=166) N	%	ORNITHOLOGY (N=78) N	%	HERPETOLOGY (N=259) N	%	ICHTHYOLOGY (N=180) N	%	VERTEBRATE FOSSILS (N=74) N	%	INVERTEBRATE FOSSILS (N=47) N	%
Basic Statistics	139	83.73	63	80.77	209	80.69	163	90.56	52	70.27	31	65.96
Calorimetry	2	1.20	1	1.28	7	2.70	1	0.56	0	0.00	0	0.00
Cartography	10	6.02	7	8.97	15	5.79	7	3.89	13	17.57	9	19.15
Computer Programming	61	36.75	18	23.08	79	30.50	52	28.89	24	32.43	11	23.40
Cost-Benefit Analysis	3	1.81	1	1.28	7	2.70	1	0.56	0	0.00	0	0.00
Data Base Management	3	1.81	1	1.28	3	1.16	7	3.89	2	2.70	2	4.26
Elec. Microsc.--SEM/TEM	12	7.23	5	6.41	20	7.72	18	10.00	5	6.76	3	6.38
Electrophoresis	10	6.02	3	3.85	32	12.36	13	7.22	3	4.05	1	2.13
Foreign Language	138	83.13	68	87.18	211	81.47	154	85.56	59	79.73	40	85.11
Game Theory	5	3.01	2	2.56	13	5.02	4	2.22	0	0.00	0	0.00
Gas Chromatography	62	37.35	1	1.28	15	5.79	2	1.11	1	1.35	0	0.00
Information Retrieval	6	3.61	2	2.56	12	4.63	6	3.33	4	5.41	3	6.38
Matrix Algebra	12	7.23	8	10.26	15	5.79	18	10.00	3	4.05	6	12.77
Mineral Analysis	65	39.16	1	1.28	8	3.09	4	2.22	17	22.97	18	38.30
Multivariate Statistics	44	26.51	10	12.82	51	19.69	51	28.33	15	20.27	9	19.15
Photography	26	15.66	15	19.23	41	15.83	29	16.11	11	14.86	11	23.40
Problem Solving/Decision Making Techniques	10	6.02	4	5.13	20	7.72	9	5.00	3	4.05	1	2.13
Public Speaking	40	24.10	24	30.77	75	28.96	53	29.44	14	18.92	9	19.15
Radioisotope Technique	7	4.22	5	6.41	16	6.18	12	6.67	2	2.70	0	0.00
Remote Sensing	7	4.22	2	2.56	7	2.70	6	3.33	1	1.35	2	4.26
Scientific Illustration	22	13.25	8	10.26	34	13.13	31	17.22	14	18.92	5	10.64
Technical Writing	41	24.70	19	24.36	56	21.62	54	30.00	20	27.03	10	21.28
Telemetry	6	3.61	5	6.41	17	6.56	2	1.11	1	1.35	0	0.00
Tissue Culture	10	6.02	4	5.13	11	4.25	11	6.11	0	0.00	2	4.26
Other	18	10.84	7	8.97	35	13.51	22	12.22	13	17.57	4	8.51

TABLE 60 Continued: Methodological courses taken by respondents, according to discipline-area.

METHODOLOGICAL COURSES	INVERTEBRATES (N=385) N	%	ENTOMOLOGY (N=501) N	%	BOTANY (N=730) N	%	MICROBIOLOGY (N=53) N	%	OTHER (N=82) N	%	TOTAL (N=2555) N	%
Basic Statistics	278	72.21	388	77.4	486	66.58	25	47.17	53	64.63	1887	74.00
Calorimetry	9	2.34	5	1.0	10	1.37	1	1.89	2	2.44	38	1.49
Cartography	17	4.42	13	2.5	23	3.15	1	1.89	2	2.44	117	4.59
Computer Programming	99	25.71	136	27.1	153	20.96	7	13.21	22	26.83	662	25.96
Cost-Benefit Analysis	6	1.56	5	1.0	6	0.82	0	0.00	2	2.44	31	1.22
Data Base Management	15	3.90	9	1.8	9	1.23	0	0.00	4	4.88	55	2.16
Elec. Microsc.--SEM/TEM	97	25.19	67	13.3	200	27.40	16	30.19	9	10.98	452	17.73
Electrophoresis	33	8.57	40	7.9	51	6.99	12	22.64	12	14.63	210	8.24
Foreign Language	331	85.97	409	81.6	639	87.53	50	94.34	59	71.95	2158	84.63
Game Theory	9	2.34	4	0.8	5	0.68	0	0.00	6	7.32	48	1.88
Gas Chromatography	22	5.71	25	4.9	42	5.75	8	15.09	8	9.76	186	7.29
Information Retrieval	24	6.23	39	7.7	30	4.11	3	5.66	7	8.54	136	5.33
Matrix Algebra	23	5.97	17	3.3	29	3.97	1	1.89	6	7.32	138	5.41
Mineral Analysis	16	4.16	3	0.6	30	4.11	4	7.55	3	3.66	169	6.63
Multivariate Statistics	74	19.22	75	14.9	95	13.01	5	9.43	10	12.20	439	17.22
Photography	71	18.44	70	13.9	125	17.12	8	15.09	8	9.76	415	16.27
Problem Solving/Decision Making Techniques	24	6.23	26	5.1	35	4.79	5	9.43	9	10.98	146	5.73
Public Speaking	97	25.19	132	26.3	164	22.47	14	26.42	27	32.93	649	25.45
Radioisotope Technique	48	12.47	25	4.9	52	7.12	20	37.74	15	18.29	202	7.92
Remote Sensing	5	1.30	7	1.4	16	2.19	0	0.00	4	4.88	57	2.24
Scientific Illustration	61	15.84	102	20.3	68	9.32	2	3.77	3	3.66	350	13.73
Technical Writing	84	21.82	119	23.7	126	17.26	10	18.87	21	25.61	560	21.96
Telemetry	1	0.26	6	1.2	1	0.14	0	0.00	2	2.44	41	1.61
Tissue Culture	38	9.87	21	4.1	52	7.12	9	16.98	5	6.10	163	6.39
Other	53	13.77	66	13.1	100	13.70	6	11.32	8	9.76	332	13.02

TABLE 61: Foreign language and other research skills that satisfied "language" requirements for highest degree received, according to respondents, by discipline-area.

RESEARCH SKILL/ LANGUAGE	MAMMALOGY (N=166) N	%	ORNITHOLOGY (N=78) N	%	HERPETOLOGY (N=259) N	%	ICHTHYOLOGY (N=180) N	%	VERTEBRATE FOSSILS (N=74) N	%	INVERTEBRATE FOSSILS (N=47) N	%
Computer:												
Course	1	0.60	0	0.00	0	0.00	1	0.56	0	0.00	0	0.00
General	3	1.81	0	0.00	2	0.77	3	1.67	0	0.00	1	2.13
Packaged Systems	1	0.60	1	1.28	3	1.16	2	1.11	1	1.35	0	0.00
Programming	22	13.25	4	5.13	28	10.81	33	18.33	11	14.86	3	6.38
Subtotal	27	16.26	5	6.41	33	12.74	39	21.67	12	24.32	4	8.51
Foreign Language:												
Chinese	0	0.00	0	0.00	2	0.77	0	0.00	0	0.00	0	0.00
English	0	0.00	2	2.56	1	0.39	1	0.56	0	0.00	0	0.00
French	90	54.22	53	67.95	103	39.77	107	59.44	45	60.81	35	74.47
German	100	60.24	45	57.69	120	46.33	98	54.44	41	55.41	39	82.98
Latin	0	0.00	2	2.56	3	1.16	3	1.67	0	0.00	2	4.26
Russian	5	3.01	3	3.85	3	1.16	13	7.22	2	2.70	2	4.26
Spanish	30	18.07	8	10.26	78	30.12	34	18.89	13	17.57	1	2.13
Other[1/]	1	0.60	0	0.00	4	1.56	1	0.56	3	4.05	0	0.00
Subtotal	226	136.14	113	144.87	314	121.26	257	142.78	104	140.54	79	168.10
Miscellaneous:												
Statistics	6	3.61	4	5.13	20	7.72	11	6.11	5	6.76	1	2.13
Other[2/]	2	1.20	0	0.00	5	2.84	1	0.56	0	0.00	1	2.13
Subtotal	8	4.81	4	5.13	25	9.65	12	6.67	5	8.11	2	4.26
TOTAL/PERCENT	261	157.23	122	156.41	372	143.63	308	171.11	121	172.97	85	180.85

[1/] Dutch, Gilbertese, Greek, Italian, Japanese, Portuguese.

[2/] Biotelemetry, Electron Microscopy, History of Science, Journalism, Mathematics, Philosophy of Science, Scientific Illustration, Systematics.

TABLE 61 Continued: Foreign language and other research skills that satisfied "language" requirements for highest degree received, according to respondents, by discipline-area.

RESEARCH SKILL/ LANGUAGE	INVERTEBRATES (N=385)		ENTOMOLOGY (N=501)		BOTANY (N=730)		MICROBIOLOGY (N=53)		OTHER (N=82)		TOTAL (N=2555)	
	N	%	N	%	N	%	N	%	N	%	N	%
Computer:												
Course	1	0.26	0	0.00	3	0.41	0	0.00	0	0.00	6	0.24
General	4	1.04	3	0.60	4	0.55	0	0.00	1	1.22	22	0.86
Packaged Systems	2	0.52	3	0.60	2	0.27	0	0.00	0	0.00	15	0.59
Programming	32	8.31	38	7.58	36	4.93	0	0.00	6	7.32	216	8.47
Subtotal	39	10.13	44	8.78	45	6.16	0	0.00	7	8.54	259	10.16
Foreign Language:												
Chinese	0	0.00	1	0.20	3	0.41	1	1.89	0	0.00	7	0.27
English	1	0.26	0	0.00	7	0.96	0	0.00	0	0.00	12	0.47
French	257	66.75	280	55.89	444	60.82	38	71.70	42	51.22	1529	59.96
German	262	68.05	314	62.67	526	72.05	42	79.25	42	51.22	1668	65.41
Latin	6	1.56	4	0.80	36	4.93	0	0.00	3	3.66	61	2.39
Russian	17	4.42	13	2.59	22	3.01	3	5.66	2	2.44	87	3.41
Spanish	40	10.39	66	13.17	122	16.71	2	3.77	14	17.07	409	16.04
Other[1/]	9	2.34	13	2.60	15	2.06	1	1.89	4	4.88	51	2.00
Subtotal	592	153.77	691	137.72	1175	160.96	87	164.15	107	130.49	3824	149.96
Miscellaneous:												
Statistics	14	3.64	11	2.20	13	1.78	1	1.89	1	1.22	88	3.45
Other[2/]	3	0.78	9	1.80	5	0.70	0	0.00	0	0.00	27	1.06
Subtotal	17	4.42	20	3.99	18	2.47	1	1.89	1	1.22	115	4.51
TOTAL/PERCENT	648	168.31	754	150.50	1238	169.59	88	166.04	115	140.24	8396	329.25

[1/] Arabic, Austrian, Czechoslovak, Dano-Norwegian, Dutch, Gilbertese, Greek, Hebrew, Indonesian, Italian, Japanese, Language Arts, Polish, Portuguese, Serbo-Croatian, Swedish.

[2/] Behavior, Biochemistry, Business Administration, Calculus, Cytogenetics, Developmental Biology, Electron Microscopy, Electronics, Electrophysiology, Geology, Microbiology, Nuclear Cytology, Pedagogy, Philosophy of Science, Tissue Culture.

TABLE 62A: Methods of financing graduate educations at the master's level, by discipline-area.*

DISCIPLINE-AREA	TEACHING ASSISTANT N	%	ASSISTANT INSTRUCTOR N	%	INSTITUTIONAL RESEARCH ASSISTANT N	%	GRANT RESEARCH ASSISTANT N	%	CURATORIAL ASSISTANT N	%	SCHOLARSHIP N	%	OTHER N	%
MAMMALOGY (N=166)	81	48.80	5	3.01	16	9.64	22	13.25	18	10.84	14	8.43	36	21.69
ORNITHOLOGY (N=78)	38	48.72	1	1.28	9	11.54	9	11.54	11	14.10	6	7.69	7	8.97
HERPETOLOGY (N=259)	134	51.74	14	5.41	17	6.56	23	8.88	27	10.42	15	5.79	58	22.39
ICHTHYOLOGY (N=180)	84	46.67	10	5.56	26	14.44	42	23.33	14	7.78	19	10.56	29	16.11
VERTEBRATE FOSSILS (N=74)	29	39.19	0	0.00	13	17.57	6	8.11	11	14.86	19	25.68	16	21.62
INVERTEBRATE FOSSILS (N=47)	25	53.19	0	0.00	5	10.64	7	14.89	3	6.38	5	10.64	10	21.28
INVERTEBRATES (N=385)	168	43.64	13	3.38	32	8.31	59	15.32	5	1.30	43	11.17	77	20.00
ENTOMOLOGY (N=501)	178	35.60	18	3.60	60	12.00	74	14.80	35	7.00	51	10.20	97	19.40
BOTANY (N=730)	364	49.86	22	3.01	66	9.04	70	9.59	47	6.44	86	11.78	129	17.67
MICROBIOLOGY (N=53)	11	20.75	1	1.89	7	13.21	19	35.85	0	0.00	16	30.19	5	9.43
OTHER (N=82)	32	39.02	4	4.88	4	4.88	10	12.20	0	0.00	14	17.07	11	13.41
TOTAL/PERCENT (N=2555)	1144	44.77	88	3.44	255	9.98	341	13.34	171	6.69	288	11.27	475	18.59

* Respondents could indicate more than one source of support.

TABLE 62B: Methods of financing graduate education at the doctoral level, by discipline-area.*

DISCIPLINE-AREA	TEACHING ASSISTANT N	%	ASSISTANT INSTRUCTOR N	%	INSTITUTIONAL RESEARCH ASSISTANT N	%	GRANT RESEARCH ASSISTANT N	%	CURATORIAL ASSISTANT N	%	SCHOLARSHIP N	%	OTHER N	%
MAMMALOGY (N=166)	92	55.42	21	12.65	27	16.27	49	29.52	36	21.69	38	22.89	42	25.30
ORNITHOLOGY (N=78)	47	60.26	12	15.38	15	19.23	21	26.92	17	21.79	19	24.36	16	20.51
HERPETOLOGY (N=259)	135	52.12	22	8.49	37	14.29	52	20.08	47	18.15	32	12.36	61	23.55
ICHTHYOLOGY (N=180)	83	46.11	16	8.89	36	20.00	68	37.78	29	16.11	36	20.00	49	27.22
VERTEBRATE FOSSILS (N=74)	32	43.24	7	9.46	15	20.27	10	13.51	17	22.97	20	27.03	17	22.97
INVERTEBRATE FOSSILS (N=47)	20	42.55	7	14.89	9	19.15	7	14.89	2	4.26	20	42.55	17	36.17
INVERTEBRATES (N=385)	202	52.47	44	11.43	71	18.44	102	26.49	18	4.68	85	22.08	97	25.19
ENTOMOLOGY (N=501)	202	40.40	34	6.80	85	17.00	134	26.80	45	9.00	93	18.60	113	22.60
BOTANY (N=730)	419	57.40	89	12.19	132	18.08	179	24.52	79	10.82	170	23.29	169	23.15
MICROBIOLOGY (N=53)	19	35.85	1	1.89	16	30.19	21	39.62	0	0.00	21	39.62	14	26.42
OTHER (N=82)	21	25.61	3	3.66	8	9.76	20	24.39	1	1.22	12	14.63	16	19.51
TOTAL/PERCENT (N=2555)	1272	49.78	256	10.01	451	17.65	663	25.94	291	11.38	546	21.36	611	23.91

* Respondents could indicate more than one source of support.

TABLE 63: Degree to which respondents were dependent upon the financial support identified in Table 62B to complete their graduate studies, according to discipline-area.

DISCIPLINE-AREA	SUPPORT NECESSARY N	%
MAMMALOGY (N=166)	131	78.92
ORNITHOLOGY (N=78)	61	78.21
HERPETOLOGY (N=259)	186	71.81
ICHTHYOLOGY (N=180)	132	73.33
VERTEBRATE FOSSILS (N=74)	59	79.73
INVERTEBRATE FOSSILS (N=47)	35	74.47
INVERTEBRATES (N=385)	285	74.03
ENTOMOLOGY (N=501)	386	77.20
BOTANY (N=730)	598	81.81
MICROBIOLOGY (N=53)	42	79.25
OTHER (N=82)	53	64.63
TOTAL/PERCENT (N=2555)	1968	77.02

Current Professional Status of Systematists

As referenced in Table 6, 84.9% of the respondents are established professionals, 3.2% are post doctorals and about 10% are graduate students. Overall, most respondents work for four year colleges or universities (64.0%); 15.3% work in museums (Table 64). More workers associated with Vertebrate Fossils are employed in museums (46.0%) than respondents in other discipline-areas. State and federal government agencies and private industry employ only a small percentage (4.7% and 8.3%, respectively) of the respondents. Nearly one-third (32.0%) of the respondents are employed on a nine month contract; one-half (49.6%) indicated they are employed on a twelve month contract (Table 65).

The overall modal salary range for all discipline-areas was $25,001 to $30,000 per year (Table 66). The modal salary range in five of the eleven discipline-areas was the same as the mode for the pooled discipline-areas (Mammalogy, Invertebrate Fossils, Invertebrates, Entomology, and Botany). In Microbiology, the mode was $35,001 to $40,000; in Ichthyology $30,001 to $35,000; in Vertebrate Fossils $20,001 to $25,000. In Herpetology, the modal salary was $0 to $10,000, probably reflecting a large percentage of students responding. Disregarding the $0 to $10,000 range, the modal salary range was $25,001 to $30,000. In Ornithology, the salary range was bimodal at $30,001 to $35,000 and $35,001 to $40,000. The category "Other" was another exception with a trimodal distribution at $25,001 to $30,000, $30,001 to $35,000, and $40,001 to $50,000. No Microbiologist reported a salary less than $20,001.

Nearly 43% of the respondents are tenured faculty members, with less than 2% holding endowed chairs (Table 67). Overall, on the basis of a frequency distribution of respondents by the number of positions they reported holding since receiving their highest degree, most respondents (39.9% of those answering the question) reported one position; 30.9% indicated two positions, 14.3% indicated three positions, and 13.4% indicated four or more positions. A total of 4,858 positions, however, were reported to be held by 2,357 respondents, representing an overall average of 2.1 positions per respondent (Table 68). Between 8% and 22% of the respondents have been employed outside of their chosen fields for an average of 8 years (Table 69).

Most respondents (68.0%) indicated their career goal was to do research in a college or university, followed by those who planned to teach in colleges or universities (64.4%) (Table 70). About one third of the respondents indicated plans to do research in museums, while 26.3% wanted to curate collections in museums. Of those indicating a desire to do research, this interest was principally in pure research (44.0%) or both pure and applied research (41.8%); 5.8% indicated a desire to work exclusively in applied research (Table 71). Over 80% of the respondents indicated their present positions were consistent with their career goals (Table 72), which is reinforced by the fact that 83.2% indicated their present positions were dependent upon their graduate training (Table 73).

Table 74 presents data on how respondents spend time on various activities in relation to their employment. Overall, respondents work an average of 46.8 hours per week, of which 41.1% is spent on research, 21.0% on teaching, and the balance split between administration (10.7%), curating (7.9%), professional services (6.5%), miscellaneous activities (5.2%), advising students (4.7%), and extension services (2.8%). These distributions are substantiated in Table 75 where, on the average, 38.2% of the respondents' time is formally allocated to research, 25.1% to teaching, and 12.8% to administration.

Of all respondents, 80.1% are still working in the same disciplines in which they received training for their highest degrees; 60.4% still work on the same taxonomic groups they studied while working for their highest degrees (Table 76). The lowest percentage reported in both categories is in "Other," where 43.9% are still working in the same disciplines, and 29.3% are still working on the same taxonomic groups.

Overall, the most common research emphasis reported by respondents is in "Interspecific Studies" (61.5%), while respondents in Microbiology and Vertebrate Fossils most often referenced "Intergeneric Studies" (69.8% and 54.1%, respectively) (Table 77). The second and third most common foci of research over all the disciplines are "Intergeneric" and "Intraspecific Studies." By and large, respondents do not emphasize "Interfamilial" or "Interordinal Studies."

The majority of the respondents consider themselves "Evolutionary Systematists" (47.3%) or do not identify with any particular group (or school) of

systematics (21.4%) (Table 78). Roughly 17% of the respondents identify with "Phylogenetics/Cladistics" and less than 4% identify with "Phenetics."

Overall, 94.1% of the respondents keep up with advances in their fields by reading scholarly journals, as well as by peer interaction (84.0%), attendance at annual meetings of professional societies (78.3%), and fieldwork (64.9%) (Table 79). About 29% of respondents participate in workshops/short courses, and 18.9% enroll in scheduled courses. The 2,555 respondents indicated that they attended 3,399 (1.33/respondent) society meetings in 1980 and 3,498 (1.37/respondent) in 1981 (Table 80). On the average, respondents attend slightly more than 2.3 meetings per year. In comparing overall meeting attendance between 1980 and 1981 the only decrease is in the number of workshops attended. Attendance in all other categories increased slightly between these years.

Overall, 66.6% of the respondents indicated that they use collections in their own institutions, while 49.0% use collections in other institutions (Table 81). The highest percentage of use of "own institution" collections is reported in Ornithology (80.8%), followed by Vertebrate Fossils (75.7%) and Botany (74.8%). Respondents in discipline-areas reporting the greatest need to use collections in other institutions are Vertebrate Fossils (56.8%), Entomology (53.4%), and Botany (52.3%).

A relatively large percentage (50.0% overall) of the respondents maintain a personal collection. The highest percentages of respondents, by discipline-area, were in Microbiology (83.0%), Entomology (65.2%), Invertebrates (62.7%), and Invertebrate Fossils (61.7%).

TABLE 64: Types of institutions for which respondents work, according to discipline-area (percentages based on total respondents to the survey).*

DISCIPLINE-AREA	MUSEUM N	%	FOUR YEAR COLLEGE/ UNIVERSITY N	%	TWO YEAR COLLEGE N	%	LABORATORY N	%	PRIVATE INDUSTRY N	%	FEDERAL GOVERNMENT AGENCY N	%	STATE GOVERNMENT AGENCY N	%	OTHER N	%
MAMMALOGY (N=166)	44	26.51	102	61.45	1	0.60	1	0.60	3	1.81	14	8.43	2	1.20	15	9.04
ORNITHOLOGY (N=78)	23	29.49	53	67.95	1	1.28	0	0.00	1	1.28	3	3.85	4	5.13	3	3.85
HERPETOLOGY (N=259)	43	16.60	153	59.07	8	3.09	5	1.93	12	4.63	17	6.56	4	1.54	37	14.29
ICHTHYOLOGY (N=180)	30	16.67	102	56.67	6	3.33	6	3.33	10	5.56	29	16.11	15	8.33	13	7.22
VERTEBRATE FOSSILS (N=74)	34	45.95	44	59.46	1	1.35	1	1.35	1	1.35	4	5.41	1	1.35	3	4.05
INVERTEBRATE FOSSILS (N=47)	8	17.02	33	70.21	0	0.00	2	4.26	1	2.13	6	12.77	1	2.13	3	6.38
INVERTEBRATES (N=385)	59	15.32	239	62.08	6	1.56	17	4.42	14	3.64	36	9.35	23	5.97	23	5.97
ENTOMOLOGY (N=501)	67	13.40	300	60.00	8	1.60	3	0.60	18	3.60	51	10.20	43	8.60	42	8.40
BOTANY (N=730)	79	10.81	529	72.37	9	1.23	4	0.55	19	2.60	52	7.11	22	3.01	49	6.70
MICROBIOLOGY (N=53)	0	0.00	38	71.70	0	0.00	2	3.77	2	3.77	5	9.43	0	0.00	8	15.09
OTHER (N=82)	4	4.88	30	36.59	1	1.22	1	1.22	10	12.20	7	8.54	6	7.32	16	19.51
TOTAL/PERCENT (N=2555)	391	15.30	1623	63.52	41	1.60	42	1.64	91	3.56	224	8.77	121	4.74	212	8.30

*Respondents could indicate more than one place of employment.

TABLE 65: Duration of respondents' employment contracts, according to discipline-area.

DISCIPLINE-AREA	NINE MONTH N	NINE MONTH %	TWELVE MONTH N	TWELVE MONTH %	LESS THAN ONE YEAR N	LESS THAN ONE YEAR %	ONE TO THREE YEARS N	ONE TO THREE YEARS %	OVER THREE YEARS N	OVER THREE YEARS %
MAMMALOGY (N=166)	44	26.51	94	56.63	13	7.82	1	0.60	0	0.00
ORNITHOLOGY (N=78)	27	34.62	39	50.00	3	3.84	0	0.00	0	0.00
HERPETOLOGY (N=259)	88	33.98	116	44.79	23	8.88	2	0.77	1	0.39
ICHTHYOLOGY (N=180)	54	30.00	97	53.89	14	7.80	2	1.12	1	0.56
VERTEBRATE FOSSILS (N=74)	19	25.68	42	56.76	3	4.05	0	0.00	1	1.35
INVERTEBRATE FOSSILS (N=47)	22	46.81	18	38.30	2	4.26	0	0.00	1	2.13
INVERTEBRATES (N=385)	134	34.81	176	45.71	28	7.28	5	1.30	0	0.00
ENTOMOLOGY (N=501)	120	24.00	286	57.20	24	4.80	2	0.40	2	0.40
BOTANY (N=730)	278	38.08	323	44.25	80	10.96	8	1.09	0	0.00
MICROBIOLOGY (N=53)	15	28.30	35	66.04	0	0.00	0	0.00	1	1.89
OTHER (N=82)	17	20.73	42	51.22	1	1.22	0	0.00	0	0.00
TOTAL/PERCENT (N=2555)	818	32.01	1268	49.62	191	7.47	20	0.78	7	0.27

TABLE 66: Salary ranges of respondents, according to discipline-area (percentages based on respondents providing data; modal range bolded).

DISCIPLINE-AREA	$ 0-10,000 N	%	10,001-15,000 N	%	15,001-20,000 N	%	20,001-25,000 N	%	25,001-30,000 N	%	30,001-35,000 N	%	35,001-40,000 N	%	40,001-50,000 N	%	ABOVE 50,000 N	%
MAMMALOGY (N=161)	20	12.42	9	5.59	18	11.18	21	13.04	27	16.77	17	10.56	16	9.94	18	11.18	15	9.32
ORNITHOLOGY (N=76)	8	10.53	0	0.00	5	6.58	12	15.79	9	11.84	16	21.05	16	21.05	6	7.89	4	5.26
HERPETOLOGY (N=256)	39	15.23	17	6.64	36	14.06	32	12.50	37	14.45	34	13.28	28	10.94	16	6.25	17	6.64
ICHTHYOLOGY (N=177)	17	9.60	10	5.65	13	7.34	26	14.69	32	18.08	33	18.64	14	7.91	19	10.73	13	7.34
VERTEBRATE FOSSILS (N=70)	8	11.43	6	8.57	8	11.43	13	18.57	12	17.14	9	12.86	5	7.14	6	8.57	3	4.29
INVERTEBRATE FOSSILS (N=44)	1	2.27	1	2.27	2	4.55	3	6.82	14	31.82	9	20.45	4	9.09	4	9.09	6	13.64
INVERTEBRATES (N=372)	36	9.68	20	5.38	39	10.48	45	12.10	64	17.20	56	15.05	38	10.22	40	10.75	34	9.14
ENTOMOLOGY (N=480)	80	16.67	18	3.75	45	9.38	58	12.08	84	17.50	61	12.71	53	11.04	50	10.42	31	6.46
BOTANY (N=705)	80	11.35	21	2.98	72	10.21	120	17.02	120	17.02	104	14.75	79	11.21	75	10.64	34	4.82
MICROBIOLOGY (N=53)	0	0.00	0	0.00	0	0.00	5	9.43	3	5.66	12	22.64	15	28.30	6	11.32	12	22.64
OTHER (N=78)	1	1.28	3	3.85	6	7.69	9	11.54	13	16.67	13	16.67	9	11.54	13	16.67	11	14.10
TOTAL/PERCENT (N=2555)	290	11.35	105	4.10	244	9.54	344	13.46	415	16.24	364	14.24	277	10.84	253	9.90	180	7.04

TABLE 67: Tenured faculty positions and endowed chairs held by respondents, according to discipline-area.

DISCIPLINE-AREA	TENURED FACULTY N	%	ENDOWED CHAIR N	%
MAMMALOGY (N=166)	65	39.63	6	3.61
ORNITHOLOGY (N=78)	36	46.15	3	3.85
HERPETOLOGY (N=259)	102	39.38	3	1.16
ICHTHYOLOGY	68	37.78	0	0.00
VERTEBRATE FOSSILS (N=74)	23	31.51	1	1.35
INVERTEBRATE FOSSILS (N=47)	25	53.19	0	0.00
INVERTEBRATES (N=385)	175	45.45	4	1.04
ENTOMOLOGY (N=501)	188	37.60	8	1.60
BOTANY (N=730)	349	47.81	18	2.47
MICROBIOLOGY (N=53)	35	68.63	1	1.89
OTHER (N=82)	25	30.49	3	3.66
TOTAL/PERCENT (N=2555)	1091	42.70	47	1.83

TABLE 68: Number of positions held by respondents since receiving their highest degree, by discipline-area.

DISCIPLINE-AREA	NUMBER RESPOND.	FREQUENCY OF NO. POSITIONS 0	1	2	3	4	>4	TOTAL POSITIONS	MEAN	STANDARD DEVIATION	RANGE
MAMMALOGY (N=166)	149	2	57	54	13	14	9	310	2.11	1.44	0-10
ORNITHOLOGY (N=78)	74	0	26	22	13	8	5	168	2.27	1.31	1- 5
HERPETOLOGY (N=259)	237	5	93	82	34	13	10	457	1.97	1.21	0- 8
ICHTHYOLOGY (N=180)	167	2	66	47	30	12	10	345	2.09	1.22	0- 6
VERTEBRATE FOSSILS (N=74)	67	2	23	27	8	5	2	127	1.96	1.08	0- 5
INVERTEBRATE FOSSILS (N=47)	46	0	19	16	8	1	2	89	1.93	1.04	1- 5
INVERTEBRATES (N=385)	357	4	138	112	54	34	15	738	2.09	1.27	0- 8
ENTOMOLOGY (N=501)	448	7	195	133	55	33	25	904	2.05	1.48	0-13
BOTANY (N=730)	683	11	284	203	94	52	39	1,391	2.07	1.44	0-15
MICROBIOLOGY (N=53)	52	0	17	15	13	1	6	126	2.42	1.63	1- 9
OTHER (N=82)	77	0	23	18	15	11	10	203	2.64	1.55	1- 8
TOTAL/PERCENT (N=2555)	2357	33	941	729	337	184	133	4858	--	--	0-15

TABLE 69: Time respondents have been employed outside of their chosen fields, by discipline-area.

DISCIPLINE-AREA	NUMBER RESPOND.	%	MEAN YEARS	STANDARD DEVIATION	RANGE
MAMMALOGY (N=166)	14	8.30	5.59	4.58	0.12-15.00
ORNITHOLOGY (N=78)	8	10.26	9.00	9.70	1.00-29.00
HERPETOLOGY (N=259)	37	14.29	7.67	6.97	0.10-27.50
ICHTHYOLOGY (N=180)	24	13.33	5.46	5.12	0.41-20.00
VERTEBRATE FOSSILS (N=74)	9	12.16	8.31	15.82	1.25-50.00
INVERTEBRATE FOSSILS (N=47)	5	10.64	10.72	7.35	4.00-22.00
INVERTEBRATES (N=385)	46	11.95	8.94	10.46	0.17-53.00
ENTOMOLOGY (N=501)	68	13.57	7.35	8.99	0.17-40.00
BOTANY (N=730)	71	9.73	6.59	6.97	0.08-36.00
MICROBIOLOGY (N=53)	7	13.21	9.36	4.77	3.00-14.50
OTHER (N=82)	18	21.95	8.16	5.39	0.66-20.00
TOTAL/PERCENT (N=2555)	307	12.01	7.92	--	0.08-53.00

TABLE 70: Career goals as reported by respondents, by discipline-area.

DISCIPLINE-AREA	RESEARCH								ADMINISTRATION/MANAGEMENT								PUBLIC COMMUNICATIONS							
	COLLEGE/ UNIVERSITY		MUSEUM		COMMERCIAL		GOV'T AGENCY		COLLEGE/ UNIVERSITY		MUSEUM		COMMERCIAL		GOV'T AGENCY		COLLEGE/ UNIVERSITY		MUSEUM		COMMERCIAL		GOV'T AGENCY	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
MAMMALOGY (N=166)	105	63.25	76	45.78	7	4.22	23	13.86	20	12.05	24	14.46	5	3.01	10	6.02	9	5.42	13	7.83	0	0.00	2	1.20
ORNITHOLOGY (N=78)	47	60.26	41	52.56	1	1.28	9	11.54	7	8.97	13	16.67	1	1.28	5	6.41	7	8.97	10	12.82	2	2.56	3	3.85
HERPETOLOGY (N=259)	162	63.28	99	38.22	10	3.86	31	11.97	20	7.72	18	6.95	6	2.32	9	3.47	13	5.02	15	5.79	5	1.93	7	2.70
ICHTHYOLOGY (N=180)	118	65.56	75	41.67	9	5.00	43	23.89	22	12.22	15	8.33	5	2.78	19	10.56	2	1.11	4	2.22	3	1.67	3	1.67
VERTEBRATE FOSSILS (N=74)	48	64.86	46	62.16	2	2.70	8	10.81	3	4.05	7	9.46	0	0.00	1	1.35	4	5.41	4	5.41	2	2.70	1	1.35
INVERTEBRATE FOSSILS (N=47)	31	65.96	15	31.91	3	6.38	4	8.51	5	10.64	4	8.51	0	0.00	2	4.26	0	0.00	1	2.13	0	0.00	2	4.26
INVERTEBRATES (N=385)	271	70.39	110	28.57	18	4.68	49	12.73	48	12.47	10	2.60	13	3.38	23	5.97	18	4.68	12	3.12	6	1.56	1	2.86
ENTOMOLOGY (N=501)	316	63.07	189	37.72	25	4.99	91	18.16	41	8.18	43	8.58	10	2.00	31	6.19	30	5.99	23	4.59	12	2.40	1	3.39
BOTANY (N=730)	553	75.75	181	24.79	38	5.21	101	13.84	112	15.34	56	7.67	17	2.33	32	4.38	56	7.67	22	3.01	7	0.96	1	1.78
MICROBIOLOGY (N=53)	42	79.25	1	1.89	7	13.21	6	11.32	14	26.42	0	0.00	3	5.66	1	1.89	0	0.00	0	0.00	0	0.00	0	0.00
OTHER (N=82)	33	40.24	7	8.54	9	10.98	9	10.98	17	20.73	4	4.88	8	9.76	17	20.73	4	4.88	1	1.22	3	3.66	2	2.44
TOTAL/PERCENT (N=2555)	1726	67.55	840	32.88	129	5.05	374	14.64	309	12.09	194	7.59	68	2.66	150	5.87	143	5.60	105	4.11	40	1.57	23	0.90

TABLE 70 Continued: Career goals as reported by respondents, by discipline-area.

	TEACHING				CURATING							
	COLLEGE/ UNIVERSITY		MUSEUM		COLLEGE/ UNIVERSITY		MUSEUM		COMMERCIAL		GOV'T AGENCY	
DISCIPLINE-AREA	N	%	N	%	N	%	N	%	N	%	N	%
MAMMALOGY (N=166)	105	63.25	16	9.64	30	18.07	67	40.36	2	1.20	7	4.22
ORNITHOLOGY (N=78)	50	64.10	13	16.67	18	23.08	31	39.74	0	0.00	1	1.28
HERPETOLOGY (N=259)	167	64.48	13	5.02	39	15.06	72	27.80	4	1.54	8	3.09
ICHTHYOLOGY (N=180)	111	61.67	13	7.22	42	23.33	57	31.67	1	0.56	7	3.89
VERTEBRATE FOSSILS (N=74)	47	63.51	11	14.86	14	18.92	37	50.00	0	0.00	2	2.70
INVERTEBRATE FOSSILS (N=47)	30	63.83	3	6.38	6	12.77	9	19.15	0	0.00	2	4.26
INVERTEBRATES (N=385)	254	65.97	16	4.16	38	9.87	79	20.52	1	0.26	9	2.34
ENTOMOLOGY (N=501)	286	57.09	41	8.18	132	26.35	170	33.93	8	1.60	31	6.19
BOTANY (N=730)	521	71.37	44	6.03	221	30.27	143	19.59	6	0.82	25	3.42
MICROBIOLOGY (N=53)	36	67.92	0	0.00	4	7.55	1	1.89	0	0.00	0	0.00
OTHER (N=82)	39	47.56	5	6.10	5	6.10	5	6.10	3	3.66	2	2.44
TOTAL/PERCENT (N=2555)	1646	64.42	175	6.84	549	21.48	671	26.26	25	0.97	94	3.67

TABLE 71: Type of research in which respondents expressed an interest (based on those individuals that indicated research as a career goal in Table 70), according to discipline-area.

DISCIPLINE-AREA	PURE RESEARCH N	PURE RESEARCH %	APPLIED RESEARCH N	APPLIED RESEARCH %	BOTH N	BOTH %
MAMMALOGY (N=166)	74	44.58	8	4.82	71	42.77
ORNITHOLOGY (N=78)	41	52.56	3	3.85	26	33.33
HERPETOLOGY (N=259)	135	52.12	11	4.25	84	32.43
ICHTHYOLOGY (N=180)	61	33.89	16	8.89	95	52.78
VERTEBRATE FOSSILS (N=74)	47	63.51	1	1.35	21	28.38
INVERTEBRATE FOSSILS (N=47)	22	46.81	2	4.26	18	38.30
INVERTEBRATES (N=385)	167	43.38	17	4.42	172	44.68
ENTOMOLOGY (N=501)	226	45.20	16	3.20	221	44.20
BOTANY (N=730)	320	43.84	25	3.42	327	44.79
MICROBIOLOGY (N=53)	9	16.98	37	69.81	4	7.55
OTHER (N=82)	10	12.20	11	13.41	28	34.15
TOTAL/PERCENT (N=2555)	1112	43.52	147	5.75	1067	41.76

TABLE 72: Consistency of career goals to respondents' positions as reported in Table 70, according to discipline-area.

DISCIPLINE-AREA	NO N	NO %	YES N	YES %
MAMMALOGY (N=166)	12	7.23	149	89.76
ORNITHOLOGY (N=78)	4	5.13	72	92.31
HERPETOLOGY (N=259)	52	20.08	200	77.22
ICHTHYOLOGY (N=180)	30	16.67	148	82.22
VERTEBRATE FOSSILS (N=74)	11	14.86	59	79.73
INVERTEBRATE FOSSILS (N=47)	0	0.00	40	85.11
INVERTEBRATES (N=385)	54	14.03	318	82.60
ENTOMOLOGY (N=501)	80	16.00	406	81.20
BOTANY (N=730)	91	12.47	625	85.62
MICROBIOLOGY (N=53)	3	5.66	50	94.34
OTHER (N=82)	16	19.51	59	71.95
TOTAL/PERCENT (N=2555)	353	13.81	2126	83.20

TABLE 73: Dependency of respondents' current positions upon their graduate training, by discipline-area.

DISCIPLINE-AREA	POSITION DEPENDENT UPON GRADUATE TRAINING N	%
MAMMALOGY (N=166)	149	89.76
ORNITHOLOGY (N=78)	72	92.31
HERPETOLOGY (N=259)	200	77.22
ICHTHYOLOGY (N=180)	148	82.22
VERTEBRATE FOSSILS (N=74)	59	79.73
INVERTEBRATE FOSSILS (N=47)	40	85.11
INVERTEBRATES (N=385)	318	82.60
ENTOMOLOGY (N=501)	406	81.20
BOTANY (N=730)	625	85.62
MICROBIOLOGY (N=53)	50	94.34
OTHER (N=82)	59	71.95
TOTAL/PERCENT (N=2555)	2126	83.20

TABLE 74: Actual allocation of hours per week to professional activities, according to discipline-area (percentages based on total hours reported).

DISCIPLINE-AREA	RESEARCH Hours	%	TEACHING Hours	%	EXTENSION SERVICES Hours	%	CURATING Hours	%	PROFESSIONAL SERVICES Hours	%	ADMINISTRATION Hours	%	ADVISING STUDENTS Hours	%	OTHER Hours	%	TOTAL HOURS
MAMMALOGY (N=166)	3096	41.44	1107	14.82	180	2.41	788	10.55	466	6.24	1088	14.56	339	4.54	407	5.45	7471
ORNITHOLOGY (N=78)	1283	34.48	729	19.59	81	2.18	332	8.92	301	8.09	437	11.74	209	5.62	349	9.38	3721
HERPETOLOGY (N=259)	4605	37.22	3013	24.36	176	1.42	1050	8.49	766	6.19	1418	11.46	663	5.36	680	5.50	12371
ICHTHYOLOGY (N=180)	3779	43.84	1455	16.88	266	3.09	569	6.60	483	5.60	1054	12.23	404	4.69	610	7.08	8620
VERTEBRATE FOSSILS (N=74)	1399	37.83	640	17.31	82	2.22	651	17.60	263	7.11	351	9.49	135	3.65	177	4.79	3698
INVERTEBRATE FOSSILS (N=47)	777	35.11	564	25.49	57	2.58	122	5.51	98	4.43	296	13.38	147	6.64	152	6.87	2213
INVERTEBRATES (N=385)	7549	42.79	3674	20.83	471	2.67	996	5.65	1211	6.87	1937	10.98	863	4.89	939	5.32	17640
ENTOMOLOGY (N=501)	10057	44.39	4018	17.74	1025	4.52	2366	10.44	1509	6.66	1697	7.49	878	3.88	1104	4.87	22654
BOTANY (N=730)	14235	40.82	8747	25.08	933	2.68	2403	6.89	2144	6.15	3193	9.16	1660	4.76	1560	4.47	34875
MICROBIOLOGY (N=53)	1277	46.49	536	19.51	17	0.62	59	2.15	212	7.72	445	16.20	164	5.97	37	1.35	2747
OTHER (N=82)	1098	30.35	653	18.05	102	2.82	161	4.45	316	8.73	910	25.15	198	5.47	180	4.98	3618
TOTAL/PERCENT (N=2555)	49155	41.09	25136	21.01	3390	2.84	9497	7.94	7769	6.49	12826	10.72	5660	4.74	6195	5.18	119628

TABLE 75: Formal allocation of respondents' time according to activity, by discipline-area.

DISCIPLINE-AREA	RESEARCH	TEACHING	EXTENSION SERVICES	CURATING	PROFESSIONAL SERVICES	ADMINIS-TRATION	ADVISING STUDENTS	OTHER
MAMMALOGY (N=166)	36.18	24.16	0.99	12.08	5.08	15.56	4.16	1.80
ORNITHOLOGY (N=78)	33.08	24.85	1.47	9.11	8.83	12.86	5.66	4.14
HERPETOLOGY (N=259)	33.51	31.23	1.43	7.95	7.62	10.35	5.10	2.81
ICHTHYOLOGY (N=180)	41.17	21.32	1.60	6.49	6.61	14.46	3.94	4.42
VERTEBRATE FOSSILS (N=74)	35.80	22.12	1.57	16.40	5.32	12.52	3.33	2.94
INVERTEBRATE FOSSILS (N=47)	38.56	28.69	0.66	5.71	4.63	10.34	4.55	6.84
INVERTEBRATES (N=385)	40.15	27.59	1.85	5.35	7.11	10.86	5.03	2.06
ENTOMOLOGY (N=501)	42.69	21.74	3.76	10.01	7.68	7.68	3.12	3.34
BOTANY (N=730)	37.64	30.73	1.93	7.02	5.88	9.34	3.88	3.57
MICROBIOLOGY (N=53)	50.71	25.31	0.07	1.36	4.32	11.59	4.77	1.88
OTHER (N=82)	30.69	18.11	1.00	4.60	8.97	25.73	3.81	7.08
AVERAGE	38.20	25.08	1.48	7.83	6.55	12.84	4.30	3.72

TABLE 76: Number of respondents who continue to work in the same broad taxonomic disciplines, and on the same taxonomic groups, as they did while working for their highest degrees, according to discipline-area.

DISCIPLINE-AREA	SAME DISCIPLINE N	SAME DISCIPLINE %	SAME TAXONOMIC GROUP N	SAME TAXONOMIC GROUP %
MAMMALOGY (N=166)	132	79.52	98	59.04
ORNITHOLOGY (N=78)	61	78.21	45	57.69
HERPETOLOGY (N=259)	198	76.45	174	67.44
ICHTHYOLOGY (N=180)	156	86.67	109	60.56
VERTEBRATE FOSSILS (N=74)	58	78.38	49	66.22
INVERTEBRATE FOSSILS (N=47)	38	80.85	26	55.32
INVERTEBRATES (N=385)	291	75.58	257	66.75
ENTOMOLOGY (N=501)	414	82.80	339	67.80
BOTANY (N=730)	621	85.07	399	54.66
MICROBIOLOGY (N=53)	42	79.25	22	41.51
OTHER (N=82)	36	43.90	24	29.27
TOTAL/PERCENT (N=2555)	2047	80.11	1542	60.35

TABLE 77: Emphases of systematic research reported by respondents, according to discipline-area.*

DISCIPLINE-AREA	INTRA-SPECIFIC STUDIES N	%	INTER-SPECIFIC STUDIES N	%	INTER-GENERIC STUDIES N	%	INTER-FAMILIAL STUDIES N	%	INTER-ORDINAL STUDIES N	%	OTHER STUDIES N	%
MAMMALOGY (N=166)	66	39.76	88	53.01	50	30.12	21	12.65	12	7.23	16	9.64
ORNITHOLOGY (N=78)	36	46.15	44	56.41	22	28.21	21	26.92	10	12.82	10	12.82
HERPETOLOGY (N=259)	125	48.26	161	62.16	70	27.03	30	11.58	13	5.02	18	6.95
ICHTHYOLOGY (N=180)	67	37.22	123	68.33	69	38.33	36	20.00	13	7.22	17	9.44
VERTEBRATE FOSSILS (N=74)	16	21.62	35	47.30	40	54.05	30	40.54	26	35.14	14	18.92
INVERTEBRATE FOSSILS (N=47)	17	36.17	26	55.32	24	51.06	14	29.79	6	12.77	5	10.64
INVERTEBRATES (N=385)	115	29.87	243	63.12	127	32.99	69	17.92	30	7.79	46	11.95
ENTOMOLOGY (N=501)	161	32.20	348	69.60	238	47.60	95	19.00	23	4.60	44	8.80
BOTANY (N=730)	237	32.47	470	64.38	234	32.05	94	12.88	44	6.03	93	12.74
MICROBIOLOGY (N=53)	21	39.62	23	43.40	37	69.81	5	9.43	1	1.89	6	11.32
OTHER (N=82)	13	15.85	10	12.20	4	4.88	3	3.66	3	3.66	13	15.85
TOTAL/PERCENT (N=2555)	874	34.20	1571	61.48	915	35.81	418	16.36	181	7.08	282	11.03

*Respondents could indicate more than one emphasis.

TABLE 78: Groups (or schools) of systematics that respondents identify with, according to discipline-area (percentages based on those answering the question).

DISCIPLINE-AREA	EVOLUTIONARY SYSTEMATICS N	%	PHENETICS N	%	PHYLOGENETICS/ CLADISTICS N	%	ECLECTIC N	%	NONE N	%
MAMMALOGY (N=166)	95	57.23	3	1.81	18	10.84	20	12.05	34	20.48
ORNITHOLOGY (N=78)	12	50.00	1	3.85	5	12.82	5	16.67	1	17.95
HERPETOLOGY (N=259)	145	55.98	2	0.77	35	13.51	27	10.42	52	20.08
ICHTHYOLOGY (N=180)	71	39.44	5	2.78	50	27.78	24	13.33	35	19.44
VERTEBRATE FOSSILS (N=74)	29	61.70	2	4.26	7	14.89	4	8.51	5	10.64
INVERTEBRATE FOSSILS (N=47)	29	61.70	2	4.26	7	14.89	4	8.51	5	10.64
INVERTEBRATES (N=385)	173	44.94	10	2.60	51	13.25	40	10.39	104	27.01
ENTOMOLOGY (N=501)	209	41.72	29	5.79	133	26.55	53	10.58	89	17.76
BOTANY (N=730)	388	53.15	42	5.75	98	13.42	87	11.92	157	21.51
MICROBIOLOGY (N=53)	15	28.30	4	7.55	7	13.21	0	0.00	28	52.83
OTHER (N=82)	22	26.83	0	0.00	5	6.10	8	9.76	27	32.93
TOTAL/PERCENT (N=2513)	1188	47.27	100	3.98	416	16.55	272	10.82	537	21.37

TABLE 79: Methods by which respondents keep up with advances in their fields, according to discipline-area.*

DISCIPLINE-AREA	WORKSHOPS/ SHORT COURSES N	%	FIELDWORK N	%	SCHOLARLY JOURNALS N	%	SABBATICAL N	%	SOCIETY ANNUAL MEETINGS N	%	PEER INTER-ACTION N	%	SCHEDULED COURSES N	%	OTHER N	%
MAMMALOGY (N=166)	46	27.71	104	62.65	159	95.78	41	24.70	144	86.75	143	86.14	34	20.48	8	4.82
ORNITHOLOGY (N=78)	20	25.64	54	69.23	72	92.31	21	26.92	66	84.62	64	82.05	13	16.67	2	2.56
HERPETOLOGY (N=259)	55	21.24	175	67.57	252	97.30	42	16.22	200	77.22	215	83.01	48	18.53	11	4.25
ICHTHYOLOGY (N=180)	60	33.33	116	64.44	172	95.56	27	15.00	150	83.33	164	91.11	31	17.22	4	2.22
VERTEBRATE FOSSILS (N=74)	9	12.16	60	81.08	71	95.95	12	16.22	62	83.78	65	87.84	13	17.57	2	2.70
INVERTEBRATE FOSSILS (N=47)	23	48.94	33	70.21	44	93.62	15	31.91	38	80.85	42	89.36	10	21.28	2	4.26
INVERTEBRATES (N=385)	114	29.61	231	60.00	360	93.51	81	21.04	311	80.78	317	82.34	68	17.66	20	5.19
ENTOMOLOGY (N=501)	139	27.80	327	65.40	454	90.80	89	17.80	378	75.60	434	86.80	87	17.40	29	5.80
BOTANY (N=730)	208	28.49	515	70.55	697	95.48	190	26.03	573	78.49	597	81.78	151	20.68	34	4.66
MICROBIOLOGY (N=53)	25	47.17	7	13.21	52	98.11	14	26.42	29	54.72	48	90.57	10	18.87	2	3.77
OTHER (N=82)	37	45.12	35	42.68	72	87.80	15	18.29	50	60.98	58	70.73	19	23.17	2	2.44
TOTAL/PERCENT (N=2555)	736	28.80	1657	64.85	2405	94.12	547	21.40	2001	78.31	2147	84.03	484	18.94	116	4.54

*Respondents could indicate more than one method.

TABLE 80: Total workshops, conferences, and society meetings attended by respondents in 1980 and 1981, according to discipline-area.

DISCIPLINE-AREA	MODE	N	WORKSHOPS 1980	WORKSHOPS 1981	CONFERENCES 1980	CONFERENCES 1981	SOC. MEETINGS 1980	SOC. MEETINGS 1981	TOTAL 1980	TOTAL 1981
MAMMALOGY (N=166)	2	30	80	51	131	127	240	221	451	399
ORNITHOLOGY (N=78)	4	16	24	18	44	40	115	122	183	180
HERPETOLOGY (N=259)	4	38	47	49	114	119	403	408	564	576
ICHTHYOLOGY (N=180)	3	30	74	77	90	100	243	237	407	414
VERTEBRATE FOSSILS (N=74)	2	18	19	12	45	38	84	87	148	137
INVERTEBRATE FOSSILS (N=47)	5	7	14	17	43	42	85	81	142	140
INVERTEBRATES (N=385)	2	63	158	132	237	221	543	526	938	879
ENTOMOLOGY (N=501)	4	69	185	151	224	300	663	753	1072	1204
BOTANY (N=730)	2	131	285	217	469	507	855	891	1609	1615
MICROBIOLOGY (N=53)	4	15	20	24	43	41	70	73	133	138
OTHER (N=82)	4	15	51	45	74	73	98	99	223	217
TOTAL	--	--	957	793	1514	1608	3399	3498	5870	5899

TABLE 81: Types of collections used by respondents, according to discipline-area.

DISCIPLINE-AREA	COLLECTIONS AT OWN INSTITUTION N	%	COLLECTIONS AT OTHER INSTITUTIONS N	%	PERSONAL COLLECTIONS N	%
MAMMALOGY (N=166)	119	71.69	84	50.60	39	23.49
ORNITHOLOGY (N=78)	63	80.77	38	49.35	11	14.10
HERPETOLOGY (N=259)	154	59.46	133	51.35	111	42.86
ICHTHYOLOGY (N=180)	126	70.00	84	46.67	57	31.67
VERTEBRATE FOSSILS (N=74)	56	75.68	42	56.76	15	39.19
INVERTEBRATE FOSSILS (N=47)	34	72.34	20	42.55	29	61.70
INVERTEBRATES (N=385)	191	49.61	161	41.82	240	62.66
ENTOMOLOGY (N=501)	356	71.20	267	53.40	326	65.20
BOTANY (N=730)	546	74.79	379	51.92	382	52.33
MICROBIOLOGY (N=53)	25	47.17	19	35.85	44	83.02
OTHER (N=82)	32	38.55	26	31.71	23	28.05
TOTAL/PERCENT (N=2555)	1702	66.61	1253	49.04	1277	49.98

Productivity in Systematic Biology

The number of graduate students being advised by respondents at the master's and doctoral levels is summarized in Tables 82 and 83, respectively. Of note is the fact that the total number of master's students reported decreased by 227 students (12.8%) between the 1980-1981 and 1981-1982 academic years. The number of doctoral students reported increased slightly (14 students) between 1980-1981 and 1981-1982. The majority of respondents report having one to three students in both academic years (22% - 23% with master's level students; 17% - 18% with doctoral students).

Overall, 13.5% of the respondents have applied for, and received, permits to work on "Endangered" or "Threatened" species (Table 84). The highest percentages of applicants reported are in Herpetology (34.0%), Ornithology (32.1%), Mammalogy (26.5%), and Ichthyology (23.3%). In Botany, 10.1% of respondents applied for and received such permits.

Nearly 80% of the respondents publish in periodicals sponsored by societies to which they belong (Table 85). In the five year period 1977-1982, 88.8% of the respondents published a total of 20,426 peer-reviewed articles (Table 86). This represents an average of 1.8 articles per year per publishing respondent. Twenty-seven percent of the respondents also reported publishing 1,542 books during their professional careers (Table 87). Over 92% of the respondents have published papers during their professional careers. Overall, the average year in which a respondent first published a paper was 1965; the modal year was 1976 (Table 88).

TABLE 82: Number of master's students being advised by respondents in the 1980-1981 and 1981-1982 academic years, according to discipline-area.

DISCIPLINE-AREA	1980-1981 TOTAL STUD.	1-3 N	1-3 %	4-6 N	4-6 %	7-9 N	7-9 %	10+ N	10+ %	1981-1982 TOTAL STUD.	1-3 N	1-3 %	4-6 N	4-6 %	7-9 N	7-9 %	10+ N	10+ %
MAMMALOGY (N=166)	154	35	21.08	7	4.21	2	1.20	2	1.20	96	38	22.89	6	3.62	1	0.60	0	0.00
ORNITHOLOGY (N=78)	88	14	17.95	8	10.26	3	3.84	0	0.00	73	16	20.51	6	7.69	2	2.56	0	0.00
HERPETOLOGY (N=259)	147	52	20.07	9	3.48	0	0.00	2	0.77	127	50	19.30	7	2.70	0	0.00	1	0.39
ICHTHYOLOGY (N=180)	187	46	25.55	14	7.78	4	2.23	0	0.00	163	49	27.22	14	7.77	2	1.12	1	0.56
VERTEBRATE FOSSILS (N=74)	56	13	17.58	5	6.76	1	1.35	0	0.00	58	18	24.33	2	2.70	1	1.35	1	1.35
INVERTEBRATE FOSSILS (N=47)	50	12	25.54	3	6.38	2	4.26	0	0.00	53	13	27.66	3	6.39	1	2.13	1	2.13
INVERTEBRATES (N=385)	239	83	21.56	16	4.16	1	0.26	1	0.26	217	74	19.22	15	3.90	1	0.26	1	0.26
ENTOMOLOGY (N=501)	252	108	21.60	13	2.60	2	0.40	0	0.00	242	101	20.20	15	3.00	1	0.20	0	0.00
BOTANY (N=730)	524	194	26.58	25	3.42	2	0.27	4	0.56	449	180	24.66	18	2.46	5	0.68	3	0.41
MICROBIOLOGY (N=53)	58	18	33.96	3	5.66	0	0.00	1	1.89	55	17	32.08	2	3.77	0	0.00	1	1.89
OTHER (N=82)	24	12	14.64	1	1.22	0	0.00	0	0.00	19	10	12.20	0	0.00	0	0.00	0	0.00
TOTAL/% (N=2555)	1779	587	22.97	104	4.07	17	0.66	10	0.39	1552	566	22.15	88	3.44	14	0.54	9	0.35

TABLE 83: Number of doctoral students being advised by respondents in the 1980-1981 and 1981-1982 academic years, according to discipline-area.

DISCIPLINE-AREA	1980-1981 TOTAL STUD.	1-3 N	1-3 %	4-6 N	4-6 %	7-9 N	7-9 %	10+ N	10+ %	1981-1982 TOTAL STUD.	1-3 N	1-3 %	4-6 N	4-6 %	7-9 N	7-9 %	10+ N	10+ %
MAMMALOGY (N=166)	102	30	18.08	8	4.82	1	0.60	0	0.00	93	34	20.48	6	3.60	0	0.00	0	0.00
ORNITHOLOGY (N=78)	55	20	25.64	4	5.13	0	0.00	0	0.00	53	21	26.92	2	2.56	0	0.00	0	0.00
HERPETOLOGY (N=259)	105	27	10.42	8	3.09	2	0.77	0	0.00	108	29	11.19	12	4.63	1	0.39	0	0.00
ICHTHYOLOGY (N=180)	104	32	17.78	12	6.67	0	0.00	0	0.00	104	36	20.00	9	5.00	0	0.00	0	0.00
VERTEBRATE FOSSILS (N=74)	29	15	20.27	1	1.35	0	0.00	0	0.00	29	14	18.92	1	1.35	0	0.00	0	0.00
INVERTEBRATE FOSSILS (N=47)	17	10	21.28	0	0.00	0	0.00	0	0.00	21	11	23.40	0	0.00	0	0.00	0	0.00
INVERTEBRATES (N=385)	184	67	17.40	13	3.38	1	0.26	0	0.00	193	70	18.18	17	4.42	0	0.00	0	0.00
ENTOMOLOGY (N=501)	227	73	14.60	16	3.20	4	0.80	0	0.00	238	78	15.60	20	4.00	1	0.20	1	0.20
BOTANY (N=730)	410	137	18.76	28	3.83	3	0.41	2	0.27	401	132	18.08	29	3.97	5	0.69	1	0.14
MICROBIOLOGY (N=53)	47	20	37.73	2	3.78	1	1.89	0	0.00	51	17	32.07	4	7.55	1	1.89	0	0.00
OTHER (N=82)	18	5	6.10	2	2.44	0	0.00	0	0.00	21	7	8.54	2	2.44	0	0.00	0	0.00
TOTAL/% (N=2555)	1298	436	17.06	94	3.67	12	0.46	2	0.07	1312	449	17.57	102	3.99	8	0.31	2	0.07

TABLE 84: Number of respondents who have applied for, and received, permits to work on "Endangered" or "Threatened" species, by discipline-area.

DISCIPLINE-AREA	PERMIT REQUESTED N	PERMIT REQUESTED %	PERMIT GRANTED N	PERMIT GRANTED %
MAMMALOGY (N=166)	44	26.51	39	23.49
ORNITHOLOGY (N=78)	25	32.05	22	28.21
HERPETOLOGY (N=259)	88	33.98	75	28.96
ICHTHYOLOGY (N=180)	42	23.33	42	23.33
VERTEBRATE FOSSILS (N=74)	7	9.46	6	8.11
INVERTEBRATE FOSSILS (N=47)	3	6.38	1	2.13
INVERTEBRATES (N=385)	39	10.13	38	9.87
ENTOMOLOGY (N=501)	27	5.40	23	4.60
BOTANY (N=730)	54*	7.40	74	10.14
MICROBIOLOGY (N=53)	1	1.89	1	1.89
OTHER (N=82)	14	17.07	12	14.63
TOTAL/PERCENT (N=2555)	344	13.46	333	13.03

*This was a two-part question in the questionnaire. It is assumed that respondents indicated that they had received permits but failed to indicate they had applied for the permit.

TABLE 85: Number of respondents who publish in periodicals sponsored by societies or organizations to which they belong, by discipline-area.

DISCIPLINE-AREA	N	%
MAMMALOGY (N=166)	131	78.92
ORNITHOLOGY (N=78)	69	88.46
HERPETOLOGY (N=259)	219	84.56
ICHTHYOLOGY (N=180)	139	77.22
VERTEBRATE FOSSILS (N=74)	51	68.92
INVERTEBRATE FOSSILS (N=47)	38	80.85
INVERTEBRATES (N=385)	314	81.56
ENTOMOLOGY (N=501)	385	77.00
BOTANY (N=730)	573	78.49
MICROBIOLOGY (N=53)	51	96.23
OTHER (N=82)	49	59.76
TOTAL/PERCENT (N=2555)	2019	79.02

TABLE 86: Number of respondents who published peer-reviewed articles between 1977 and 1982, by discipline-area.

DISCIPLINE-AREA	MODE/N	NUMBER RESPOND.	%	TOTAL ARTICLES	MEAN	STANDARD DEVIATION
MAMMALOGY (N=166)	1/18	143	86.14	1,322	9.24	9.29
ORNITHOLOGY (N=78)	10/14	69	88.46	609	8.83	9.66
HERPETOLOGY (N=259)	1/23 2/23 3/23	233	89.96	1,892	8.12	9.11
ICHTHYOLOGY (N=180)	2/21	165	91.67	1,358	8.23	10.69
VERTEBRATE FOSSILS (N=74)	2/10	66	89.19	529	8.02	11.58
INVERTEBRATE FOSSILS (N=47)	1/ 6 10/ 6	47	100.00	466	9.91	9.42
INVERTEBRATES (N=385)	2/40	358	92.99	3,446	9.63	10.79
ENTOMOLOGY (N=501)	1/42	432	86.23	4,060	9.40	10.34
BOTANY (N=730)	2/71	646	88.49	5,475	8.48	9.60
MICROBIOLOGY (N=53)	10/ 8	47	88.68	734	15.62	15.20
OTHER (N=82)	2/ 8	62	75.61	535	8.63	12.99
TOTAL/PERCENT (N=2555)	2/173	2268	88.76	20,426	--	--

TABLE 87: Number of respondents who published books, by discipline-area.

DISCIPLINE-AREA	NUMBER RESPOND.	%	TOTAL BOOKS	MEAN	STANDARD DEVIATION	RANGE
MAMMALOGY (N=166)	56	33.73	159	2.84	3.83	1-22
ORNITHOLOGY (N=78)	26	33.33	54	2.08	1.76	1- 9
HERPETOLOGY (N=259)	60	23.17	125	2.08	2.63	1-20
ICHTHYOLOGY (N=180)	44	24.44	73	1.66	0.83	1- 4
VERTEBRATE FOSSILS (N=74)	18	24.32	32	1.78	1.31	1- 5
INVERTEBRATE FOSSILS (N=47)	20	42.55	43	2.15	1.84	1- 9
INVERTEBRATES (N=385)	107	27.79	240	2.24	2.83	1-26
ENTOMOLOGY (N=501)	115	22.95	286	2.49	3.05	1-19
BOTANY (N=730)	213	29.18	457	2.15	1.81	1-11
MICROBIOLOGY (N=53)	14	26.42	32	2.29	2.67	1- 9
OTHER (N=82)	19	23.17	41	2.16	1.77	1- 8
TOTAL/PERCENT (N=2555)	692	27.08	1542	--	--	1-26

TABLE 88: Year respondent published first paper, by discipline-area.

DISCIPLINE-AREA	NUMBER RESPOND.	%	MODE/N	MEAN	STANDARD DEVIATION
MAMMALOGY (N=166)	153	92.17	1965/10	1965.86	11.92
ORNITHOLOGY (N=78)	73	93.59	1963/ 6	1961.86	12.34
HERPETOLOGY (N=259)	239	92.28	1964/14 1976/14	1967.87	10.80
ICHTHYOLOGY (N=180)	169	93.89	1969/13 1974/13	1968.04	9.97
VERTEBRATE FOSSILS (N=74)	68	91.89	1978/ 6	1967.87	12.69
INVERTEBRATE FOSSILS (N=47)	46	97.87	1965/ 5	1961.93	12.34
INVERTEBRATES (N=385)	368	95.58	1969/21	1965.04	12.33
ENTOMOLOGY (N=501)	461	92.02	1978/24	1964.97	12.81
BOTANY (N=730)	671	91.92	1976/35	1965.39	12.78
MICROBIOLOGY (N=53)	52	98.11	1961/ 6 1965/ 6	1963.31	6.88
OTHER (N=82)	63	76.83	1975/ 8	1966.27	10.92
TOTAL/PERCENT (N=2555)	2363	92.48	1976/49	1965.31	--

Priorities for Funding According to the Systematics Community

According to respondents, the chief priorities for funding from the Systematic Biology program (NSF) were: 1) research resulting in taxonomic revisions or monographs; 2) floral or faunal surveys; 3) organismic characterizations using a variety of techniques but without an immediate intent to revise taxonomic relationships; 4) collaborative research; and 5) predoctoral research programs (Tables 89A and 89B).

"Floral or Faunal Surveys" ranked first in Mammalogy, Ornithology, and Herpetology. "Taxonomic Revisions or Monographs" ranked first for all other discipline-areas except Microbiology, which considered "Organismic Characterizations" of greatest importance. Priorities for "Theoretical (nontaxon dependent) Studies," "Undergraduate Research," and "Tropical Studies" ranked lowest. Microbiologists had different priorities than those in the other discipline-areas. Their priorities were: 1) organismic characterizations; 2) equipment for research; 3) taxonomic revisions or monographs; 4) post doctoral research; and 5) predoctoral research.

Priorities for funding from the Biological Research Resources program (NSF), from the perspective of individual researchers, were assessed for: 1) the types of facilities that should be supported; 2) the broad programmatic areas that should be emphasized; and 3) within the broad programmatic areas identified, the types of general operating support that are needed.

From the perspective of what types of facilities should be supported, opinion of respondents was equally divided between supporting "National/International Centers" and "Regional Centers" as the first priority for funding (Table 90A).

On a discipline-area basis (Table 90B), the types of facilities determined to be the first priority for support are:

National/International Centers: Ornithology, Ichthyology, Invertebrate Fossils, Invertebrates, Entomology, and Microbiology.

Regional Centers: Mammalogy, Herpetology, and Botany.

Respondents in Vertebrate Fossils were equally divided in their first priority between **National/International Centers** and **Regional/Topical Centers.**

Considering the discipline-areas separately or as pooled, the first priority for broad programmatic funding by the Biological Research Resources program is overwhelmingly "General Operating Support" (70.8%); "Equipment" is second and "Publications" third (Tables 91 and 92).

Within the programmatic area of "Types of General Operating Support" (Table 93), the greatest expressed need in all discipline-areas is for (in descending order of importance): 1) collection management personnel; 2) computerization of specimen data; 3) updating and revising specimen data; 4) reorganization of collections; and 5) renovation and construction of collection facilities.

On a discipline-area basis, these trends are reinforced. The exceptions are in Invertebrate Fossils, where "Computerization of Specimen Data" ranked third, and Entomology, where "Computerization of Specimen Data" ranked fourth and "Relocating/Consolidating Collections" fifth (Table 94).

Within the programmatic area of "Equipment" (ranked second across all programmatic areas), the pooled respondents ranked their needs (in descending order of importance) as follows: 1) storage cases/compactors; 2) multi-user research equipment; and 3) computer hardware/software (Table 95). Considering individual discipline-areas, there were marked exceptions to this trend (Table 96). Respondents in Invertebrates and Microbiology ranked "Multi-User Research Equipment" first; those in Microbiology ranked "Storage Cases" last.

Within the third ranked programmatic area, "Publications," the overwhelming majority (86.3%) of the respondents indicated that "Monographs" are their first choice for support over other types of publications (Tables 97 and 98).

TABLE 89A: Respondents' pooled recommended priorities (1st through 5th) for funding from the Systematic Biology program (percentages based on pooled total number of rankings within a priority category).

CUMULATIVE PRIORITY CATEGORY	FLORAL/ FAUNAL SURVEYS N	%	ORGANISMIC CHARACTER-IZATIONS N	%	TAXONOMIC REVISIONS/ MONOGRAPHS N	%	THEO-RETICAL STUDIES N	%	WORKSHOPS SYMPOSIA N	%	COLLAB-ORATIVE RESEARCH N	%	INTERDIS-CIPLINARY RESEARCH N	%	RESEARCH EQUIPMENT N	%	PRE-DOCTORAL RESEARCH N	%	POST DOCTORAL RESEARCH N	%	TROPICAL RESEARCH N	%	UNDER-GRADUATE RESEARCH N	%	TOTAL
FIRST	495	20.25	323	13.21	668	27.32	48	1.96	62	2.54	170	6.96	170	6.95	86	3.52	122	4.99	94	3.84	166	6.79	40	1.64	2444
FIRST	495	20.25	323	13.21	668	27.32	48	1.96	62	2.54	170	6.96	170	6.95	86	3.52	122	4.99	94	3.84	166	6.79	40	1.64	2444
SECOND	414	17.16	267	11.07	380	15.75	117	4.85	111	4.60	200	8.29	175	7.26	150	6.22	168	6.97	170	7.05	191	7.92	69	2.86	2412
Subtotal	909	18.72	590	12.15	1048	21.58	165	3.40	173	3.56	370	7.62	345	7.10	236	4.86	290	5.97	264	5.44	357	7.35	109	2.24	4856
FIRST	495	20.25	323	13.21	668	27.32	48	1.96	62	2.54	170	6.96	170	6.95	86	3.52	122	4.99	94	3.84	166	6.79	40	1.64	2444
SECOND	414	17.16	267	11.07	380	15.75	117	4.85	111	4.60	200	8.29	175	7.26	150	6.22	168	6.97	170	7.05	191	7.92	69	2.86	2412
THIRD	242	10.00	193	10.05	199	8.22	94	3.88	128	5.29	199	8.22	154	6.36	185	9.63	171	7.06	139	5.74	153	6.32	64	2.64	1921
Subtotal	1151	16.98	783	11.55	1247	18.40	259	3.82	301	4.44	569	8.40	499	7.36	421	6.21	461	6.80	403	5.95	510	7.53	173	2.55	6777
FIRST	495	20.25	323	13.21	668	27.32	48	1.96	62	2.54	170	6.96	170	6.95	86	3.52	122	4.99	94	3.84	166	6.79	40	1.64	2444
SECOND	414	17.16	267	11.07	380	15.75	117	4.85	111	4.60	200	8.29	175	7.26	150	6.22	168	6.97	170	7.05	191	7.92	69	2.86	2412
THIRD	242	10.00	193	10.05	199	8.22	94	3.88	128	5.29	199	8.22	154	6.36	185	9.63	171	7.06	139	5.74	153	6.32	64	2.64	1921
FOURTH	147	9.09	142	8.78	124	7.66	103	6.37	134	8.28	155	9.58	135	8.34	189	11.68	177	10.94	152	9.39	115	7.11	45	2.78	1618
Subtotal	1298	15.46	925	11.02	1371	16.33	362	4.31	435	5.18	724	8.62	634	7.55	610	7.27	638	7.60	555	6.61	625	7.44	218	2.60	8395
FIRST	495	20.25	323	13.21	668	27.32	48	1.96	62	2.54	170	6.96	170	6.95	86	3.52	122	4.99	94	3.84	166	6.79	40	1.64	2444
SECOND	414	17.16	267	11.07	380	15.75	117	4.85	111	4.60	200	8.29	175	7.26	150	6.22	168	6.97	170	7.05	191	7.92	69	2.86	2412
THIRD	242	10.00	193	10.05	199	8.22	94	3.88	128	5.29	199	8.22	154	6.36	185	9.63	171	7.06	139	5.74	153	6.32	64	2.64	1921
FOURTH	147	9.09	142	8.78	124	7.66	103	6.37	134	8.28	155	9.58	135	8.34	189	11.68	177	10.94	152	9.39	115	7.11	45	2.78	1618
FIFTH	107	7.63	102	7.28	88	6.28	96	6.85	116	8.27	154	10.98	119	8.49	150	10.70	166	11.84	148	10.56	109	7.77	47	3.35	1402
Subtotal	1405	14.34	1027	10.48	1459	14.89	458	4.67	551	5.62	878	8.96	753	7.69	760	7.76	804	8.21	703	7.18	734	7.49	265	2.70	9797

TABLE 89B: Respondents' recommended priorities (1st through 5th) for funding from the Systematic Biology program, according to discipline-area (percentages based on total rankings in a priority category, within a discipline-area).

DISCIPLINE-AREA	PRIORITY	FLORAL/FAUNAL SURVEYS N	%	ORGANISMIC CHARACTERIZATIONS N	%	TAXONOMIC REVISIONS/MONOGRAPHS N	%	THEORETICAL STUDIES N	%	WORKSHOPS SYMPOSIA N	%	COLLABORATIVE RESEARCH N	%	INTERDISCIPLINARY RESEARCH N	%	RESEARCH EQUIPMENT N	%	PREDOCTORAL RESEARCH N	%	POST DOCTORAL RESEARCH N	%	TROPICAL RESEARCH N	%	UNDERGRADUATE RESEARCH N	%	TOTAL RANKING
MAMMALOGY (N=166)	1ST	29	17.79	23	14.11	26	15.95	3	1.84	2	1.23	15	9.20	13	7.98	6	3.68	18	11.04	10	6.13	15	9.20	3	1.84	163
	2ND	26	16.88	20	12.99	16	10.39	14	9.09	9	5.84	7	4.55	12	7.79	7	4.55	15	9.74	12	7.79	11	7.14	5	3.25	154
	3RD	16	13.33	17	14.17	17	14.17	4	3.33	13	10.83	9	7.50	7	5.83	10	8.33	13	10.83	5	4.17	6	5.00	3	2.50	120
	4TH	7	6.54	10	9.35	12	11.21	7	6.54	8	7.48	10	9.35	7	6.54	13	12.15	9	8.41	16	14.95	6	5.61	2	1.87	107
	5TH	5	5.43	5	5.43	7	7.61	5	5.43	7	7.61	8	8.70	13	14.13	10	10.87	10	10.87	5	5.43	10	10.87	7	7.61	92
ORNITHOLOGY (N=78)	1ST	26	34.21	13	17.11	8	10.53	2	2.63	2	2.63	6	7.89	3	3.95	3	3.95	3	3.95	1	1.32	8	10.53	1	1.32	76
	2ND	13	18.31	8	11.27	11	15. 9	3	4.23	3	4.23	4	5.63	6	8.45	4	5.63	2	2.82	4	5.63	10	14.08	3	4.23	71
	3RD	4	6.35	2	3.17	9	14.29	10	15.87	3	4.76	1	1.59	10	15.87	7	11.11	8	12.70	4	6.35	4	6.35	1	1.59	63
	4TH	4	8.00	3	6.00	4	8.00	2	4.00	4	8.00	9	18.00	4	8.00	7	14.00	7	14.00	4	8.00	2	4.00	0	0.00	50
	5TH	4	8.89	3	6.67	2	4.44	4	8.89	2	4.44	6	13.33	5	11.11	0	0.00	4	8.89	6	13.33	7	15.56	2	4.44	45
HERPETOLOGY (N=259)	1ST	47	19.75	42	17.65	37	15.55	5	2.10	7	2.94	16	6.72	25	10.50	10	4.20	11	4.62	9	3.78	24	10.08	5	2.10	238
	2ND	33	13.25	24	9.64	31	12.45	11	4.42	11	4.42	30	12.05	14	5.62	15	6.02	23	9.24	24	9.64	23	9.24	10	4.02	249
	3RD	25	11.79	22	10.38	20	9.43	7	3.30	17	8.02	23	10.85	29	13.68	16	7.55	18	8.49	11	5.19	11	5.19	13	6.13	212
	4TH	13	7.43	16	9.14	14	8.00	10	5.71	10	5.71	16	9.14	20	11.43	20	11.43	20	11.43	15	8.57	13	7.43	8	4.57	175
	5TH	11	7.19	6	3.92	11	7.19	11	7.19	9	5.88	22	14.38	10	6.54	11	7.19	29	18.95	18	11.76	14	9.15	1	0.65	153
ICHTHYOLOGY (N=180)	1ST	37	20.44	29	16.02	52	28.73	2	1.11	4	2.22	15	8.33	18	10.00	1	0.56	6	3.33	8	4.44	4	2.22	4	2.22	180
	2ND	39	21.79	22	12.29	15	8.38	10	5.59	5	2.79	20	11.17	20	11.17	9	5.03	14	7.82	8	4.47	13	7.26	4	2.23	179
	3RD	10	7.09	8	5.67	15	10.64	14	9.93	13	9.22	21	14.89	11	7.80	15	10.64	12	8.51	12	8.51	7	4.96	3	2.13	141
	4TH	10	8.47	4	3.39	9	7.63	10	8.47	15	12.71	11	9.32	7	5.93	10	8.47	17	14.41	10	8.47	8	6.78	7	5.93	118
	5TH	7	6.80	9	8.74	5	4.85	8	7.77	9	8.74	9	8.74	10	9.71	13	12.62	10	9.71	15	14.56	5	4.85	3	2.91	103
VERTEBRATE FOSSILS (N=74)	1ST	11	15.28	7	9.72	15	20.83	0	0.00	2	2.78	8	11.11	15	20.83	2	2.78	4	5.56	6	8.33	1	1.39	1	1.39	72
	2ND	8	11.43	9	12.86	13	18.57	5	7.14	0	0.00	9	12.86	9	12.86	4	5.71	6	8.57	4	5.71	3	4.29	0	0.00	70
	3RD	5	8.93	9	16.07	6	10.71	2	3.57	4	7.14	7	12.50	6	10.71	6	10.71	3	5.36	6	10.71	0	0.00	2	3.57	56
	4TH	5	10.20	2	4.08	5	10.20	4	8.16	1	2.04	3	6.12	5	8.47	5	10.20	9	18.37	5	10.20	3	6.12	2	4.08	49
	5TH	2	5.56	1	2.78	4	11.11	3	8.33	6	16.67	3	8.33	3	8.33	2	5.56	5	13.89	3	8.33	1	2.78	3	8.33	36
INVERTEBRATE FOSSILS (N=47)	1ST	6	13.95	3	6.98	16	37.21	3	6.98	2	4.65	5	11.63	6	13.95	1	2.33	1	2.33	0	0.00	0	0.00	0	0.00	43
	2ND	8	17.02	6	12.77	6	12.77	5	10.64	2	4.26	6	12.77	6	12.77	4	8.51	1	2.13	0	0.00	0	0.00	3	6.38	47
	3RD	5	13.16	5	13.16	3	7.89	2	5.26	0	0.00	4	10.53	1	2.63	8	21.05	3	7.89	3	7.89	4	10.53	0	0.00	38
	4TH	2	7.14	2	7.14	1	3.57	2	7.14	2	7.14	3	10.71	2	7.14	2	7.14	5	17.86	2	7.14	4	14.29	1	3.57	28
	5TH	0	0.00	4	22.22	2	11.11	1	5.56	2	11.11	0	0.00	1	5.56	2	11.11	1	5.56	5	27.78	0	0.00	0	0.00	18
INVERTEBRATES (N=385)	1ST	62	16.85	47	12.77	99	26.90	6	1.63	12	3.26	39	10.60	22	5.98	15	4.08	25	6.79	12	3.26	21	5.71	8	2.17	368
	2ND	63	17.45	55	15.24	47	13.02	15	4.16	14	3.88	31	8.59	27	7.48	30	8.31	19	5.26	41	11.36	9	2.49	10	2.77	361
	3RD	41	14.64	25	8.93	30	10.71	12	4.29	17	6.07	25	8.93	23	8.21	35	12.50	27	9.64	28	10.00	15	5.36	2	0.71	280
	4TH	24	10.26	22	9.40	23	9.83	10	4.27	19	8.12	21	8.97	20	8.55	30	12.82	27	11.54	21	8.97	10	4.27	7	2.99	234
	5TH	16	8.00	15	7.50	19	9.50	17	8.50	20	10.00	23	11.50	19	9.50	13	6.50	24	12.00	15	7.50	10	5.00	9	4.50	200
ENTOMOLOGY (N=501)	1ST	114	23.70	33	6.86	202	42.00	12	2.49	5	1.04	20	4.16	20	4.16	12	2.49	15	3.12	16	3.33	26	5.41	6	1.25	481
	2ND	95	19.75	35	7.28	94	19.54	20	4.16	23	4.78	32	6.65	31	6.44	18	3.74	33	6.86	39	8.11	52	10.81	9	1.87	481
	3RD	60	14.81	43	10.62	41	10.12	14	3.46	27	6.67	46	11.36	23	5.68	20	4.94	45	11.11	21	5.19	49	12.10	16	3.95	405
	4TH	31	9.04	35	10.20	23	6.71	27	7.87	34	9.91	38	11.08	25	7.29	44	12.83	24	7.00	31	9.04	27	7.87	4	1.17	343
	5TH	20	6.58	21	6.91	11	3.62	22	7.24	21	6.91	34	11.18	25	8.22	47	15.46	38	12.50	25	8.22	33	10.86	7	2.30	304
BOTANY (N=730)	1ST	151	21.45	92	13.07	205	29.12	9	1.28	17	2.41	36	5.11	35	4.97	30	4.26	32	4.55	25	3.55	61	8.66	11	1.56	704
	2ND	120	17.37	77	11.14	134	19.39	28	4.05	34	4.92	52	7.53	40	5.79	47	6.80	44	6.37	30	4.34	65	9.41	20	2.89	691
	3RD	72	13.38	58	10.78	52	9.67	25	4.65	28	5.20	56	10.41	39	7.25	58	10.78	33	6.13	42	7.81	54	10.04	21	3.90	538
	4TH	48	10.28	45	9.64	31	6.64	27	5.78	34	7.28	41	8.78	43	9.21	55	11.78	52	11.13	41	8.78	39	8.35	11	2.36	467
	5TH	40	9.71	35	8.50	26	6.31	21	5.10	35	8.50	43	10.44	29	7.04	48	11.65	43	10.44	53	12.86	26	6.31	13	3.16	412
MICROBIOLOGY (N=53)	1ST	1	2.04	24	48.98	3	6.12	1	2.04	1	2.04	5	10.20	3	6.12	3	6.12	3	6.12	2	4.08	3	6.12	0	0.00	49
	2ND	2	4.26	4	8.51	8	17.02	4	8.51	5	10.64	3	6.38	2	4.26	9	19.15	3	6.38	4	8.51	1	2.13	2	4.26	47
	3RD	0	0.00	0	0.00	3	11.54	1	3.85	2	7.69	2	7.69	1	3.85	4	15.38	5	19.23	6	23.08	1	3.85	1	3.85	26
	4TH	0	0.00	2	10.00	0	0.00	1	5.00	3	15.00	0	0.00	1	5.00	2	10.00	5	25.00	4	20.00	0	0.00	2	10.00	20
	5TH	1	8.33	0	0.00	1	8.33	1	8.33	0	0.00	5	41.67	0	0.00	0	0.00	1	8.33	1	8.33	1	8.33	1	8.33	12
OTHER (N=82)	1ST	11	15.71	10	14.29	5	7.14	5	7.14	8	11.43	5	7.14	10	14.29	3	4.29	4	5.71	5	7.14	3	4.29	1	1.43	70
	2ND	7	11.29	7	11.29	5	8.06	2	3.23	5	8.06	6	9.68	8	12.90	3	4.84	8	12.90	4	6.45	4	6.45	3	4.84	62
	3RD	4	9.52	4	9.52	3	7.14	3	7.14	4	9.52	5	11.90	4	9.52	6	14.29	4	9.52	1	2.38	2	4.76	2	4.76	42
	4TH	3	11.11	1	3.70	2	7.41	3	11.11	4	14.81	3	11.11	1	3.70	1	3.70	2	7.41	3	11.11	3	11.11	1	3.70	27
	5TH	1	3.70	3	11.11	0	0.00	3	11.11	5	18.52	1	3.70	4	14.81	4	14.81	1	3.70	2	7.41	2	7.41	1	3.70	27

TABLE 90A: Accumulated pooled respondents' priorities (1st through 3rd) for types of facilities that should be funded by the Biological Research Resources program (NSF) (percentages based on total rankings in a priority category, within a discipline-area).

CUMULATIVE PRIORITY CATEGORY	NATIONAL/ INTERNATIONAL CENTERS N	%	REGIONAL/ TOPICAL CENTERS N	%	LOCAL/ PAROCHIAL CENTERS N	%	TOTAL RANKING
FIRST	955	41.18	976	42.09	388	16.73	2319
FIRST	955	41.18	976	42.09	388	16.73	2319
SECOND	673	29.02	1098	47.35	418	18.03	2189
Subtotal	1628	36.11	2074	46.01	806	17.88	4508
FIRST	955	41.18	976	42.09	388	16.73	2319
SECOND	673	29.02	1098	47.35	418	18.03	2189
THIRD	507	21.86	105	4.53	1038	44.76	1650
Subtotal	2135	34.67	2179	35.38	1844	29.94	6158

TABLE 90B: Respondents' Priorities (1st through 3rd) for types of facilities that should be funded by the Biological Research Resources program (NSF) (percentages based on total rankings in a priority category, within a discipline-area).

DISCIPLINE-AREA	PRIORITY	NATIONAL/INTERNATIONAL CENTERS N	%	REGIONAL/TOPICAL CENTERS N	%	LOCAL/PAROCHIAL CENTERS N	%	TOTAL RANKING
MAMMALOGY (N=166)	1ST	56	39.16	67	46.85	20	13.99	143
	2ND	49	35.51	64	46.38	25	18.12	138
	3RD	28	29.17	3	3.13	65	67.71	96
ORNITHOLOGY (N=78)	1ST	32	45.07	29	40.85	10	14.08	71
	2ND	22	33.85	34	52.31	9	13.85	65
	3RD	9	17.31	3	5.77	40	76.92	52
HERPETOLOGY (N=259)	1ST	100	42.55	102	43.40	33	14.04	235
	2ND	72	31.86	114	50.44	40	17.70	226
	3RD	50	27.32	8	4.37	125	68.31	183
ICHTHYOLOGY (N=180)	1ST	75	44.64	65	38.69	28	16.67	168
	2ND	39	24.38	84	52.50	37	23.13	160
	3RD	43	34.96	7	5.69	73	59.35	123
VERTEBRATE FOSSILS (N=74)	1ST	28	40.00	28	40.00	14	20.00	70
	2ND	18	26.47	29	42.65	21	30.88	68
	3RD	16	40.00	6	15.00	18	45.00	40
INVERTEBRATE FOSSILS (N=47)	1ST	25	56.82	16	36.36	3	6.82	44
	2ND	12	30.77	23	58.97	4	10.26	39
	3RD	4	15.38	1	3.85	21	80.77	26
INVERTEBRATES (N=385)	1ST	143	41.45	141	40.87	61	17.68	345
	2ND	99	30.37	160	49.08	67	20.55	326
	3RD	83	34.44	18	7.47	140	58.09	241
ENTOMOLOGY (N=501)	1ST	209	45.04	190	40.95	65	14.01	464
	2ND	145	33.03	231	52.62	63	14.35	439
	3RD	80	24.02	19	5.71	234	70.27	333
BOTANY (N=730)	1ST	246	36.55	297	44.13	130	19.32	673
	2ND	191	30.13	311	49.05	132	20.82	634
	3RD	170	34.98	31	6.38	285	58.64	486
MICROBIOLOGY (N=53)	1ST	23	50.00	13	28.26	10	21.74	46
	2ND	9	23.68	23	60.53	6	15.79	38
	3RD	9	33.33	5	18.52	13	48.15	27
OTHER (N=82)	1ST	18	30.00	28	46.67	14	23.33	60
	2ND	17	30.36	25	44.64	14	25.00	56
	3RD	15	34.88	4	9.30	24	55.81	43

TABLE 91: Accumulated pooled priorities (1st through 3rd) for broad programmatic areas that should be funded by the Biological Research Resources program (NSF) (percentages based on total pooled rankings within a priority category). See Table 92 for breakdown by discipline-area.

CUMULATIVE PRIORITY CATEGORY	GEN. OPERATING SUPPORT N	%	EQUIPMENT N	%	PUBLICATIONS N	%	TOTAL
FIRST	1497	70.85	302	14.29	314	14.86	2113
FIRST	1497	70.85	302	14.29	314	14.86	2113
SECOND	375	17.75	1018	48.18	623	29.48	2016
Subtotal	1872	45.94	1320	31.97	937	22.69	4129
FIRST	1497	70.85	302	14.29	314	14.86	2113
SECOND	375	17.75	1018	48.18	623	29.48	2016
THIRD	198	9.37	620	29.34	950	44.96	1768
Subtotal	2070	35.10	1940	32.90	1887	32.00	5897

TABLE 92: Respondents' priorities (1st through 3rd) of broad programmatic areas that should be funded by the Biological Research Resources program (NSF), by discipline-area (percentages based on total rankings in a priority, within a discipline-area).

DISCIPLINE-AREA	PRIORITY	GENERAL OPERATING SUPPORT N	%	EQUIPMENT N	%	PUBLICATIONS N	%	TOTAL RANKINGS
MAMMALOGY (N=166)	1ST	106	76.26	17	12.23	16	11.51	139
	2ND	23	17.04	81	60.00	31	22.96	135
	3RD	8	6.96	33	28.70	74	64.35	115
ORNITHOLOGY (N=78)	1ST	49	80.33	9	14.75	3	4.92	61
	2ND	9	14.52	33	53.23	20	32.26	62
	3RD	5	8.93	17	30.36	34	60.71	56
HERPETOLOGY (N=259)	1ST	174	76.65	27	11.89	26	11.45	227
	2ND	33	15.21	119	54.84	65	29.95	217
	3RD	18	9.23	67	34.36	110	56.41	195
ICHTHYOLOGY (N=180)	1ST	122	76.73	17	10.69	20	12.58	159
	2ND	19	13.01	84	57.53	43	29.45	146
	3RD	9	7.38	44	36.07	69	56.56	122
VERTEBRATE FOSSILS (N=74)	1ST	58	85.29	5	7.35	5	7.35	68
	2ND	4	6.67	35	58.33	21	35.00	60
	3RD	4	7.27	19	34.55	32	58.18	55
INVERTEBRATE FOSSILS (N=47)	1ST	29	80.56	2	5.56	5	13.89	36
	2ND	5	14.29	18	51.43	12	34.29	35
	3RD	2	6.06	14	42.42	17	51.52	33
INVERTEBRATES (N=385)	1ST	209	65.72	53	16.67	56	17.61	318
	2ND	57	18.45	139	44.98	113	36.57	309
	3RD	42	15.44	103	37.87	127	46.69	272
ENTOMOLOGY (N=501)	1ST	284	68.60	44	10.63	86	20.77	414
	2ND	91	22.47	182	44.94	132	32.59	405
	3RD	39	10.89	154	43.02	165	46.09	358
BOTANY (N=730)	1ST	405	66.72	114	18.78	88	14.50	607
	2ND	121	21.04	289	50.26	165	28.70	575
	3RD	64	12.72	150	29.82	289	57.46	503
MICROBIOLOGY (N=53)	1ST	31	77.50	6	15.00	3	7.50	40
	2ND	6	18.18	19	57.58	8	24.24	33
	3RD	2	8.00	7	28.00	16	64.00	25
OTHER (N=82)	1ST	30	68.18	8	18.18	6	13.64	44
	2ND	7	17.95	19	48.72	13	33.33	39
	3RD	5	14.71	12	35.29	17	50.00	34

TABLE 93: Respondents' priorities (1st through 5th) for specific types of general operating support that should be funded by the Biological Research Resources program (percentages based on total rankings within a priority category). See Table 94 for breakdown by discipline-area.

CUMULATIVE PRIORITY CATEGORY	RELOCATING/ CONSOLIDATING COLLECTIONS N	%	COLLECTION MANAGEMENT PERSONNEL N	%	REORGANIZATION OF COLLECTONS N	%	RENOVATION/ CONSTRUCTION N	%	EMERGENCY/ SPECIAL ASSISTANCE N	%	UPDATING/ REVISING SPECIMEN DATA N	%	COMPUTER-IZATION OF SPECIMEN DATA N	%	TOTAL
FIRST	177	9.08	685	35.15	169	8.67	141	7.23	193	9.90	233	11.95	351	18.01	1949
FIRST	177	9.08	685	35.15	169	8.67	141	7.23	193	9.90	233	11.95	351	18.01	1949
SECOND	228	11.89	267	13.93	317	16.54	227	11.84	153	7.98	371	19.35	354	18.47	1917
Subtotal	405	10.48	952	24.62	486	12.57	368	9.98	346	8.95	604	15.62	705	18.23	3866
FIRST	177	9.08	685	35.15	169	8.67	141	7.23	193	9.90	233	11.95	351	18.01	1949
SECOND	228	11.89	267	13.93	317	16.54	227	11.84	153	7.98	371	19.35	354	18.47	1917
THIRD	203	12.53	213	13.15	328	20.25	214	13.21	155	9.57	250	15.43	257	15.86	1620
Subtotal	608	11.08	1165	21.23	814	14.84	582	10.61	501	9.13	854	15.57	962	17.53	5486
FIRST	177	9.08	685	35.15	169	8.67	141	7.23	193	9.90	233	11.95	351	18.01	1949
SECOND	228	11.89	267	13.93	317	16.54	227	11.84	153	7.98	371	19.35	354	18.47	1917
THIRD	203	12.53	213	13.15	328	20.25	214	13.21	155	9.57	250	15.43	257	15.86	1620
FOURTH	162	12.10	177	13.22	284	21.21	222	16.58	132	9.86	200	14.94	162	12.10	1339
Subtotal	770	11.28	1342	19.66	1098	16.09	804	11.78	633	9.27	1054	15.44	1124	16.47	6825
FIRST	177	9.08	685	35.15	169	8.67	141	7.23	193	9.90	233	11.95	351	18.01	1949
SECOND	228	11.89	267	13.93	317	16.54	227	11.84	153	7.98	371	19.35	354	18.47	1917
THIRD	203	12.53	213	13.15	328	20.25	214	13.21	155	9.57	250	15.43	257	15.86	1620
FOURTH	162	12.10	177	13.22	284	21.21	222	16.58	132	9.86	200	14.94	162	12.10	1339
FIFTH	174	15.28	134	11.76	188	16.51	195	17.12	157	13.78	151	13.26	140	12.29	1139
Subtotal	944	11.85	1476	18.53	1286	16.15	999	12.54	790	9.92	1205	15.13	1264	15.87	7964

TABLE 94: Respondents' priorities (1st through 5th) for types of general operating support that should be funded by the Biological Research Resources program, by discipline-area (percentages based on total rankings in a priority category within a discipline-area).

DISCIPLINE-AREA	PRIORITY	RELOCATING/ CONSOLIDATING COLLECTIONS N	%	COLLECTION MANAGEMENT PERSONNEL N	%	REORGANIZATION OF COLLECTONS N	%	RENOVATION/ CONSTRUCTION N	%	EMERGENCY/ SPECIAL ASSISTANCE N	%	UPDATING/ REVISING SPECIMEN DATA N	%	COMPUTER-IZATION OF SPECIMEN DATA N	%	TOTAL RANKING
MAMMALOGY (N=166)	1ST	8	6.02	34	25.56	15	11.28	13	9.77	22	16.54	20	15.04	21	15.79	133
	2ND	13	9.42	24	17.39	13	9.42	14	10.14	11	7.97	28	20.29	35	25.36	138
	3RD	16	13.91	23	20.00	16	13.91	22	19.13	8	6.96	14	12.17	16	13.91	115
	4TH	7	6.80	10	9.71	33	32.04	11	10.68	7	6.80	19	18.45	16	15.53	103
	5TH	15	17.44	7	8.14	18	20.93	14	16.28	14	16.28	11	12.79	7	8.14	86
ORNITHOLOGY (N=78)	1ST	8	12.90	18	29.03	2	3.23	8	12.90	5	8.06	3	4.84	18	29.03	62
	2ND	4	6.78	10	16.95	15	25.42	3	5.08	6	10.17	9	15.25	12	20.34	59
	3RD	4	7.14	6	10.71	12	21.43	11	19.64	4	7.14	9	16.07	10	17.86	56
	4TH	6	12.24	5	10.20	6	12.24	9	18.37	3	6.12	14	28.57	6	12.24	49
	5TH	5	12.82	7	17.95	8	20.51	4	10.26	3	7.69	4	10.26	8	20.51	39
HERPETOLOGY (N=259)	1ST	23	10.45	65	29.55	17	7.73	13	5.91	21	9.55	29	13.18	52	23.64	220
	2ND	27	12.68	25	11.74	26	12.21	22	10.33	15	7.04	53	24.88	45	21.13	213
	3RD	20	10.36	25	12.95	44	22.80	21	10.88	21	10.88	32	16.58	30	15.54	193
	4TH	17	10.49	25	15.43	34	20.99	23	14.20	15	9.26	24	14.81	24	14.81	162
	5TH	22	16.18	18	13.24	24	17.65	29	21.32	19	13.97	15	11.03	9	6.62	136
ICHTHYOLOGY (N=180)	1ST	20	14.39	45	32.37	9	6.47	14	10.07	17	12.23	12	8.63	22	15.83	139
	2ND	19	13.97	17	12.50	21	15.44	17	12.50	12	8.82	20	14.71	30	22.06	136
	3RD	12	10.17	15	12.71	20	16.95	20	16.95	12	10.17	23	19.49	16	13.56	118
	4TH	16	15.84	15	14.85	20	19.80	12	11.88	7	6.93	18	17.82	13	12.87	101
	5TH	12	12.90	11	11.83	20	21.51	14	15.05	10	10.75	12	12.90	14	15.05	93
VERTEBRATE FOSSILS (N=74)	1ST	5	7.94	26	41.27	10	15.87	3	4.76	4	6.35	9	14.29	6	9.52	63
	2ND	7	10.61	12	18.18	11	16.67	11	16.67	6	9.09	6	9.09	13	19.70	66
	3RD	2	3.51	10	17.54	14	24.56	6	10.53	7	12.28	10	17.54	8	14.04	57
	4TH	6	12.00	6	12.00	15	30.00	7	14.00	3	6.00	6	12.00	7	14.00	50
	5TH	8	22.86	3	8.57	0	0.00	8	22.86	1	2.86	3	8.57	12	34.29	35
INVERTEBRATE FOSSILS (N=47)	1ST	4	10.00	15	37.50	7	17.50	0	0.00	2	5.00	5	12.50	7	17.50	40
	2ND	2	5.00	3	7.50	14	35.00	4	10.00	3	7.50	6	15.00	8	20.00	40
	3RD	6	17.65	6	17.65	3	8.82	3	8.82	3	8.82	7	20.59	6	17.65	34
	4TH	0	0.00	7	29.17	2	8.33	6	25.00	2	8.33	5	20.83	2	8.33	24
	5TH	1	6.25	1	6.25	3	18.75	3	18.75	1	6.25	2	12.50	5	31.25	16
INVERTEBRATES (N=385)	1ST	29	9.73	84	28.19	32	10.74	14	4.70	25	8.39	50	16.78	64	21.48	298
	2ND	33	11.38	51	17.59	36	12.41	24	8.28	26	8.97	59	20.34	61	21.03	290
	3RD	28	11.34	36	14.57	38	15.38	25	10.12	22	8.91	46	18.62	52	21.05	247
	4TH	21	10.61	29	14.65	45	22.73	28	14.14	21	10.61	27	13.64	27	13.64	198
	5TH	23	13.77	22	13.17	34	20.36	37	22.16	15	8.98	20	11.98	16	9.58	167
ENTOMOLOGY (N=501)	1ST	25	6.49	196	50.91	45	11.69	27	7.01	25	6.49	24	6.23	43	11.17	385
	2ND	46	11.89	49	12.66	88	22.74	58	14.99	24	6.20	75	19.38	47	12.14	387
	3RD	51	15.84	33	10.25	76	23.60	47	14.60	26	8.07	38	11.80	51	15.84	322
	4TH	40	15.27	26	9.92	45	17.18	57	21.76	31	11.83	34	12.98	29	11.07	262
	5TH	32	14.22	18	8.00	32	14.22	39	17.33	38	16.89	32	14.22	34	15.11	225
BOTANY (N=730)	1ST	49	8.99	184	33.76	28	5.14	46	8.44	64	11.74	72	13.21	99	18.17	542
	2ND	69	13.07	68	12.88	85	16.10	70	13.26	48	9.09	99	18.75	89	16.86	528
	3RD	58	13.27	54	12.36	95	21.74	58	13.27	46	10.53	61	13.96	65	14.87	437
	4TH	46	12.92	50	14.04	77	21.63	63	17.70	42	11.80	48	13.48	30	8.43	356
	5TH	52	16.67	41	13.14	43	13.78	44	14.10	51	16.35	49	15.71	32	10.26	312
MICROBIOLOGY (N=53)	1ST	4	11.76	9	26.47	3	8.82	0	0.00	4	11.76	5	14.71	9	26.47	34
	2ND	5	15.15	2	6.06	6	18.18	2	6.06	0	0.00	9	27.27	9	27.27	33
	3RD	3	16.67	2	11.11	4	22.22	0	0.00	1	5.56	5	27.78	3	16.67	18
	4TH	1	9.09	0	0.00	2	18.18	3	27.27	0	0.00	2	18.18	3	27.27	11
	5TH	1	9.09	4	36.36	3	27.27	1	9.09	1	9.09	1	9.09	0	0.00	11
OTHER (N=82)	1ST	2	6.06	9	27.27	1	3.03	3	9.09	4	12.12	4	12.12	10	30.30	33
	2ND	3	11.11	6	22.22	2	7.41	2	7.41	2	7.41	7	25.93	5	18.52	27
	3RD	3	13.04	3	13.04	6	26.09	1	4.35	5	21.74	5	21.74	0	0.00	23
	4TH	2	8.70	4	17.39	5	21.74	3	13.04	1	4.35	3	13.04	5	21.74	23
	5TH	3	15.79	2	10.53	3	15.79	2	10.53	4	21.05	2	10.53	3	15.79	19

TABLE 95: Respondents' pooled priorities (1st through 3rd) for types of equipment acquisitions that should be funded by the Biological Research Resources program (NSF) (percentages based on total pooled rankings within a priority category). See Table 96 for breakdown by discipline-area.

CUMULATIVE PRIORITY CATEGORY	STORAGE CASES/ COMPACTORS N	%	COMPUTER HARDWARE/ SOFTWARE N	%	MULTI-USER RESEARCH EQUIPMENT N	%	TOTAL
FIRST	814	44.43	493	26.91	525	28.66	1832
FIRST	814	44.43	493	26.91	525	28.66	1832
SECOND	395	22.44	681	38.69	684	38.86	1760
Subtotal	1209	33.66	1174	32.68	1209	33.66	3592
FIRST	814	44.43	493	26.91	525	28.66	1832
SECOND	395	22.44	681	38.69	684	38.86	1760
THIRD	480	32.99	519	35.67	456	31.34	1455
Subtotal	1689	33.47	1693	33.54	1665	32.99	5047

TABLE 96: Respondents' priorities (1st through 3rd) for types of equipment acquisitions that should be funded by the Biological Research Resources program, by discipline-area (percentages based on total rankings in a priority category, within a discipline-area).

DISCIPLINE-AREA	PRIORITY	STORAGE CASES/COMPACTORS N	%	COMPUTER HARDWARE/SOFTWARE N	%	MULTI-USER RESEARCH EQUIPMENT N	%	TOTAL RANKINGS
MAMMALOGY (N=166)	1ST	63	52.50	35	29.17	22	18.33	120
	2ND	26	20.97	64	51.61	34	27.42	124
	3RD	30	31.58	19	20.00	46	48.42	95
ORNITHOLOGY (N=78)	1ST	32	53.33	18	30.00	10	16.67	60
	2ND	11	19.30	27	47.37	19	33.33	57
	3RD	15	28.85	12	23.08	25	48.08	52
HERPETOLOGY (N=259)	1ST	77	37.93	75	36.95	51	25.12	203
	2ND	53	25.98	80	39.22	71	34.80	204
	3RD	65	37.36	46	26.44	63	36.21	174
ICHTHYOLOGY (N=180)	1ST	51	40.48	38	30.16	37	29.37	126
	2ND	30	24.59	55	45.08	37	30.33	122
	3RD	32	31.37	29	28.43	41	40.20	102
VERTEBRATE FOSSILS (N=74)	1ST	39	63.93	14	22.95	8	13.11	61
	2ND	10	17.24	25	43.10	23	39.66	58
	3RD	11	23.91	11	23.91	24	52.17	46
INVERTEBRATE FOSSILS (N=47)	1ST	19	55.88	4	11.76	11	32.35	34
	2ND	7	21.21	14	42.42	12	36.36	33
	3RD	8	26.67	14	46.67	8	26.67	30
INVERTEBRATES (N=385)	1ST	80	28.88	95	34.30	102	36.82	277
	2ND	67	26.07	86	33.46	104	40.47	257
	3RD	95	44.60	73	34.27	45	21.13	213
ENTOMOLOGY (N=501)	1ST	213	57.41	79	21.29	79	21.29	371
	2ND	86	24.43	106	30.11	160	45.45	352
	3RD	59	19.41	152	50.00	93	30.59	304
BOTANY (N=730)	1ST	228	43.68	114	21.84	180	34.48	522
	2ND	98	19.44	205	40.67	201	39.88	504
	3RD	143	35.22	155	38.18	108	26.60	406
MICROBIOLOGY (N=53)	1ST	3	10.00	12	40.00	15	50.00	30
	2ND	3	11.54	11	42.31	12	46.15	26
	3RD	12	85.71	2	14.29	0	0.00	14
OTHER (N=82)	1ST	9	32.14	9	32.14	10	35.71	28
	2ND	4	17.39	8	34.78	11	47.83	23
	3RD	10	52.63	6	31.58	3	15.79	19

TABLE 97: Respondents' pooled priorities (1st through 2nd) for types of publications that should be funded by the Biological Research Resources program (NSF) (percentages based on total pooled rankings within a priority category). See Table 98 for breakdown by discipline-area.

CUMULATIVE PRIORITY CATEGORY	MONOGRAPHS N	MONOGRAPHS %	OTHER N	OTHER %	TOTAL
FIRST	1159	86.30	184	13.70	1343
FIRST	1159	86.30	184	13.70	1343
SECOND	174	29.15	423	70.85	597
Subtotal	1333	68.71	607	31.29	1940

TABLE 98: Respondents' priorities (1st and 2nd) for types of publications that should be funded by the Biological Research Resources program (NSF), by discipline-area (percentages based on total rankings in a priority category, within a discipline-area).

DISCIPLINE-AREA	PRIORITY	MONOGRAPHS N	MONOGRAPHS %	OTHER N	OTHER %	TOTAL RANKINGS
MAMMALOGY (N=166)	1ST	66	85.71	11	14.29	77
	2ND	11	30.56	25	69.44	36
ORNITHOLOGY (N=78)	1ST	34	89.47	4	10.53	38
	2ND	3	17.65	14	82.35	17
HERPETOLOGY (N=259)	1ST	116	82.27	25	17.73	141
	2ND	22	38.60	35	61.40	57
ICHTHYOLOGY (N=180)	1ST	73	83.91	14	16.09	87
	2ND	13	34.21	25	65.79	38
VERTEBRATE FOSSILS (N=74)	1ST	37	82.22	8	17.78	45
	2ND	8	44.44	10	55.56	18
INVERTEBRATE FOSSILS (N=47)	1ST	23	88.46	3	11.54	26
	2ND	3	21.43	11	78.57	14
INVERTEBRATES (N=385)	1ST	179	87.32	26	12.68	205
	2ND	25	25.25	74	74.75	99
ENTOMOLOGY (N=501)	1ST	266	89.86	30	10.14	296
	2ND	28	23.14	93	76.86	121
BOTANY (N=730)	1ST	340	86.08	55	13.92	395
	2ND	54	29.83	127	70.17	181
MICROBIOLOGY (N=53)	1ST	12	75.00	4	25.00	16
	2ND	3	50.00	3	50.00	6
OTHER (N=82)	1ST	13	76.47	4	23.53	17
	2ND	4	40.00	6	60.00	10

SECTION 6: FINANCIAL ASPECTS OF THE SYSTEMATICS COMMUNITY

PRINCIPAL INDICATORS

1. Thirty-two percent of the respondents to the physical resources survey either indicated that they had no operating budget allocated for their collections (11%) or did not provide information (21%) (Table 99).

2. The average operating budget (excluding the United States Geological Survey) for a systematics collection with a budget was $5,620 in 1981 and $4,582 in 1975 (Tables 99 and 100).

3. Overall, 15% of the respondents to the physical resources survey indicated that funds awarded in research grants were used in direct support of the collections. Thirty-two percent of those indicating research grants provided support for their collections cited National Science Foundation (NSF) as the source of funding (Table 104).

4. About 50% of the respondents indicated that their research was supported by personal funds (Table 108).

5. Fifty-eight percent of the respondents reported receiving $165,000,000 in grant/contract support between 1977 and 1982 (Table 109); the average grant recipient received 2.2 awards during this period.

6. Based on the number of grants reported by respondents, 56% were awarded from federal agencies; 15% were from the respondents' institutions; 12% were from private, not-for-profit organizations. Overall, 27% of the number of grants reported were from the NSF (Tables 110A and 110B).

7. Based on total dollars awarded respondents, 82% of the funds were from federal agencies; 1% was from respondents' institutions; 3% were from private (not-for-profit) sources; and 6% were from private industry (Table 110A). Overall, 40% of the dollars awarded were from the NSF.

8. All five programs in the Division of Biotic Systems and Resources of the NSF were found to support systematics research or systematics facilities (Tables 111 through 130).

Collection Management Costs

Data provided on collection operating budgets (excluding salaries) in 1981 and 1975 are presented in Tables 99 and 100, respectively. In 1981, 128 (11%) collections reported they had no budget available. Average budgets in 1981 (based on data from 775 collections) ranged from $2,560 to $52,125, depending on the discipline-area. The range was $5 to $1,500,000 per year. Invertebrate Fossils had the highest average collection budget; it was an order of magnitude above any other, except Microbiology. This high value reflects the

substantial programs of the United States Geological Survey (USGS). When data from the USGS are removed, the mean budget for Invertebrate Fossils drops from $52,000 to slightly under $7,000. The only discipline-areas with mean budgets exceeding $5,000 are (in descending order): Microbiology ($14,100), Entomology ($9,900), Vertebrate Fossils ($7,100), Invertebrate Fossils ($6,900, excluding USGS), and Invertebrates ($6,200). Budgets for Microbiology ($14,100) were generally double those of other discipline-areas. Mammalogy collections had the lowest mean budget ($2,600).

When 1981 budgets (Table 99) are compared with 1975 budgets (Table 100), the overall average increase in mean budget was $2,460 ($492 per year) when the USGS programs (which increased $650,000 in five years) are excluded. The smallest increases were in Mammalogy ($51 per year) and Botany ($143 per year); the largest increases were in Vertebrate Fossils ($742 per year), Invertebrates ($654 per year), and Ichthyology ($450 per year).

If one assumes a 10% inflation rate each year between 1975 and 1981, budgets of four discipline-areas did not keep pace with inflation: Mammalogy, Invertebrate Fossils (excluding USGS), Botany, and Microbiology. The average budget for Herpetology kept pace with inflation, while those for the other discipline-areas gained on inflation. The most significant gains were in Invertebrates and Entomology.

Those reporting decreased purchasing power over the five year period attribute it primarily to inflation (57%) and secondarily to changes in administrative policies (22%) (Tables 101 and 102). The greatest losses due to administrative decisions are in Botany, Invertebrate Fossils, and Ichthyology.

In considering budget adjustments (reductions in staff, operating budget, etc.) for the same period, there are 610 collection responses (Table 103). The least number of collections affected by budget reductions was in Microbiology (60.0%). The greatest number of reductions occurred in Invertebrate Fossils (88%), Ichthyology (82%), and Herpetology (80%). The principal areas of budget reductions were for supplies and miscellaneous expenses, equipment, hourly personnel, and technical staff. Only in Vertebrate Fossils were reductions in professional staff ranked within the top three categories of budget reductions. Only in Ichthyology and Invertebrate Fossils were budget reductions accomodated by reducing collection maintenance ranked within the top three categories reduced.

TABLE 99: Collection operating budgets, excluding salaries, in 1981, according to discipline-area.

DISCIPLINE-AREA	NUMBER NO RESPONSE N	%	WITHOUT BUDGET N	%	WITH BUDGET N	%	TOTAL	RANGE LOW	HIGH	MEAN[1/]	MEAN[2/]
MAMMALOGY (N=127)	23	18.1	21	16.5	83	65.4	$212,461	$25	$25,000	$2,560	$2,043
ORNITHOLOGY (N=114)	20	17.5	21	18.4	73	64.0	$280,406	$15	$125,000	$3,841	$3,015
HERPETOLOGY (N=69)	12	17.4	11	15.9	49	71.0	$168,993	$75	$76,230	$3,449	$2,817
ICHTHYOLOGY (N=92)	13	14.1	9	9.8	70	76.1	$283,603	$50	$190,000	$4,051	$3,590
VERTEBRATE FOSSILS (N=55)	18	32.7	0	0.0	37	67.3	$262,317	$28	$50,000	$7,089	$7,089
INVERTEBRATE FOSSILS[3/] (N=62)	14	22.6	15	24.2	33	53.2	$1,720,121	00	$1,500,000	$ 52,125	$35,836
INVERTEBRATE FOSSILS[4/] (N=61)	14	23.0	15	24.6	32	52.5	$220,121	00	$75,000	$6,879	$4,683
INVERTEBRATES (N=75)	15	20.0	11	14.7	49	65.3	$301,749	$ 5	$80,000	$6,158	$5,029
ENTOMOLOGY (N=176)	38	21.6	12	6.8	126	71.6	$1,244,763	$10	$470,779	$9,879	$9,020
BOTANY (N=302)	75	24.8	14	4.6	213	70.5	$789,411	$10	$164,540	$3,706	$3,478
MICROBIOLOGY (N=70)	14	20.0	14	20.0	42	60.0	$592,231	$10	$241,100	$14,101	$10,576
TOTAL (N=1141)[4/]	242	21.2	128	11.2	775	67.9	$4,356,055[4/]	--	---	---	---

1/ Based on the number of respondents that cited a budget for collection maintenance (third column).
2/ Based on the total number of respondents answering this question in the survey (second plus third column).
3/ **With** data from the United States Geological Survey.
4/ **Without** data from the United States Geological Survey.

TABLE 100: Collection operating budgets, excluding salaries, in 1975, by discipline-area.

DISCIPLINE-AREA	NUMBER NO RESPONSE N	%	WITHOUT BUDGET N	%	WITH BUDGET N	%	TOTAL	RANGE LOW	HIGH	MEAN[1/]	MEAN[2/]
MAMMALOGY (N=127)	34	30.0	27	21.3	66	52.0	$152,465	$10	$27,154	$2,305	$1,636
ORNITHOLOGY (N=114)	29	25.4	23	20.2	62	54.4	$116,581	$10	$35,000	$1,880	$1,372
HERPETOLOGY (N=69)	13	18.8	17	24.6	39	56.5	$88,746	$30	$30,000	$2,276	$1,585
ICHTHYOLOGY (N=92)	27	29.3	13	14.1	52	56.5	$93,751	$50	$12,000	$1,803	$1,442
VERTEBRATE FOSSILS (N=55)	13	23.6	1	1.8	31	56.4	$114,115	$10	$28,000	$3,804	$3,381
INVERTEBRATE[3/] FOSSILS (N=62)	15	24.2	16	25.8	31	50.0	$991,659	$100	$850,000	$31,989	$21,099
INVERTEBRATE[4/] FOSSILS (N=61)	16	26.2	16	26.2	30	49.2	$141,659	$100	$60,000	$4,722	$3,080
INVERTEBRATES (N=75)	22	29.3	14	18.7	39	52.0	$112,673	$ 5	$20,000	$2,889	$2,126
ENTOMOLOGY (N=176)	55	31.3	10	5.7	111	63.1	$331,894	$20	$53,227	$2,990	$2,743
BOTANY (N=302)	112	37.1	19	6.3	172	57.0	$515,911	$ 5	$132,675	$2,999	$2,701
MICROBIOLOGY (N=70)	22	31.4	15	21.4	33	47.1	$392,092	$10	$175,600	$11,882	$8,169
TOTAL (N=1141)[4/]	358	31.4	171	15.0	666	58.4	$3,051,546[4/]	--	---	---	---

1/ Based on the number of respondents that cited a budget for collection maintenance (third column).
2/ Based on the total number of respondents answering this question in the survey. (second plus third columns).
3/ With data from the United States Geological Survey.
4/ Without data from the United States Geological Survey.

TABLE 101: Causes of decreased purchasing power in collections over the past five years, expressed as a percent of frequency classes according to discipline-area (respondents could indicate more than one cause; percentages based on total responses within a discipline-area).

DISCIPLINE-AREA	CAUSES: INFLATION	ADJ. COLN. POLICIES	ADJ. ADMIN. POLICIES	LOSS EXTERN. FUNDING	OTHER[1/]
MAMMALOGY (N=127)	59.6	3.0	16.2	9.1	12.1
ORNITHOLOGY (N=114)	55.6	4.0	23.2	5.1	12.1
HERPETOLOGY (N=69)	61.9	3.2	22.2	7.9	4.8
ICHTHYOLOGY (N=92)	53.7	5.3	25.3	6.3	9.5
VERTEBRATE FOSSILS (N=55)	62.5	2.1	12.5	10.4	12.5
INVERTEBRATE FOSSILS (N=62)	48.4	1.6	30.6	6.5	12.9
INVERTEBRATES (N=75)	51.9	5.2	22.1	11.7	9.1
ENTOMOLOGY (N=176)	60.0	7.1	14.8	9.7	8.4
BOTANY (N=302)	57.4	0.8	30.6	4.9	6.4
MICROBIOLOGY (N=70)	59.7	3.0	11.9	19.4	6.0
AVERAGE (N=1030)	57.2	3.4	22.4	8.2	8.8

1/Reduced funds given to department, loss of research grants, reduced support for higher education in general, new curatorship, funds rebudgeted for research, decline in student enrollment, loss of state funding, union benefits to employees.

TABLE 102: Causes of decreased purchasing power in collections over the past five years, expressed as frequency distributions, according to discipline-area (respondents could indicate more than one cause).

DISCIPLINE-AREA	CAUSES: INFLATION	ADJ. COLN. POLICIES	ADJ. ADMIN. POLICIES	LOSS EXTERN. FUNDING	OTHER[1]	TOTAL FREQUENCY
MAMMALOGY (N=127)	59	3	16	9	12	99
ORNITHOLOGY (N=114)	55	4	23	5	12	99
HERPETOLOGY (N=69)	39	2	14	5	3	63
ICHTHYOLOGY (N=92)	51	5	24	6	9	95
VERTEBRATE FOSSILS (N=55)	30	1	6	5	6	48
INVERTEBRATE FOSSILS (N=62)	30	1	19	4	8	62
INVERTEBRATES (N=75)	40	4	17	9	7	77
ENTOMOLOGY (N=176)	93	11	23	15	13	155
BOTANY (N=302)	152	2	81	13	17	265
MICROBIOLOGY (N=70)	40	2	8	13	4	67
TOTAL	589	35	231	84	91	1030

[1] Reduced funds given to department, loss of research grants, reduced support for higher education in general, new curatorship, funds rebudgeted for research, decline in student enrollment, loss of state funding, union benefits to employees.

TABLE 103: Type of adjustments in collection budgets (expressed as a percent of the number of respondents to the question) implemented by respondents over the past five years, by discipline-area.

ACTION TAKEN	DISCIPLINE-AREA: MAMMALOGY	ORNITHOLOGY	HERPETOLOGY	ICHTHYOLOGY	VERTEBRATE FOSSILS
Number Responses	73	57	45	44	44
NO ADJUSTMENTS	28.7	24.6	20.0	18.2	25.0
REDUCTIONS IN:					
Profnl. Staff	8.3	7.0	6.7	6.8	9.1
Techn. Staff	13.7	8.8	13.3	6.8	9.1
Grad. Students	2.7	12.3	8.9	13.6	0.0
Hourly Personnel	15.1	14.0	20.0	11.4	4.5
Publications	1.4	1.8	2.2	0.0	0.0
Equipment	15.1	10.5	8.9	6.8	6.8
Coln. Maint.	4.1	5.3	8.9	13.6	2.3
Supplies & Misc.	6.8	10.5	6.7	15.9	15.9
SERVICE FEE	0.0	0.0	0.0	2.3	0.0
OTHER[1]/	4.1	5.3	4.4	4.5	2.3

TABLE 103 Continued: Type of adjustments in collection budgets (expressed as a percent of the number of respondents to the question) implemented by respondents over the past five years, by discipline-area.

ACTION TAKEN	DISCIPLINE-AREA: INVERTEBRATE FOSSILS	INVERTEBRATES	ENTOMOLOGY	BOTANY	MICROBIOLOGY
NUMBER RESPONSES	34	42	96	138	37
NO ADJUSTMENTS	11.8	21.4	23.9	28.3	40.5
REDUCTIONS IN:					
Profnl. Staff	8.8	7.7	5.2	10.1	2.7
Techn. Staff	2.9	9.6	9.4	7.2	24.3
Grad. Students	2.9	4.8	3.1	00.7	0.0
Hourly Personnel	17.6	7.1	8.3	11.6	0.0
Publications	0.0	2.4	0.0	0.0	0.0
Equipment	11.8	21.4	27.1	11.3	5.4
Coln. Maint.	14.7	4.8	6.3	4.3	0.0
Supplies & Misc.	20.6	16.7	8.3	22.5	16.2
SERVICE FEE	0.0	0.0	2.1	0.0	2.7
OTHER[1]/	8.8	4.8	6.3	3.6	8.1

[1]/Expenses were covered by other divisions, private contributions, grant support, reduced collecting, reduced travel funds, transfer of collection to another institution.

Sources of Support for Collections

Individual research grants provide limited funds for support of collections (Table 104). Overall, 15% of the respondents to the physical resources survey indicated that funds awarded from research grants were used in direct support of collections. Of those reporting such research grant support, the greatest source (54%) was from the pooled group labeled "Other" (i.e., state grants and contracts, institutional research grants, support from the United States Department of Agriculture, and private foundations). The second largest source of funding was the NSF (32%) followed by the National Institutes of Health (NIH) (9%).

State funding was the greatest source for collection maintenance budgets (44%), followed by federal (14%) and "Other" sources (12%) (Tables 105A, 105B, and 105C). Private sources and "Other" sources accounted for 23%. The considerable amounts contributed by state governments are associated with the large number of systematics collections maintained in state colleges and universities.

Grant support for collection maintenance comes from either the NSF and other federal agencies or from a group of sources: institutional discretionary funds, state grants programs, institutional research grants, Institute of Museum Services, Comprehensive Employment Training Act (CETA), private foundations, and private individuals (Tables 104, 106A, and 106B). The degree to which funds are budgeted from grants given by this group of sources is equal to or surpasses such funds provided by the NSF in nine of 10 discipline-areas (54%); the exception is Herpetology.

During a five year period (1976-1981), 195 proposals for collection support were declined (39 per year); these declined proposals were equally distributed among discipline-areas (Table 107). Most of them involved a variety of sources pooled under the category "Other." Overall, an average of 24% of the declined proposals had been submitted to the NSF.

TABLE 104: Degree to which funds are budgeted from individual research grants in support of collections, according to discipline-area.

DISCIPLINE-AREA	PERCENT[1] RESEARCH GRANTS CONTRIBUTED TO SUPPORT OF RESPONDENT COLLECTIONS	SOURCE OF FUNDING[2] NATIONAL SCIENCE FOUNDATION	NATIONAL INSTITUTES OF HEALTH	NATIONAL MUSEUM ACT	FISH & WILDLIFE SERVICE	OTHER[3]
MAMMALOGY (N=127)	9.4	41.7	16.7	0.0	8.3	33.3
ORNITHOLOGY (N=114)	5.3	16.7	0.0	0.0	0.0	83.3
HERPETOLOGY (N=69)	10.1	0.0	14.3	0.0	14.3	71.4
ICHTHYOLOGY (N=92)	21.7	21.7	8.7	0.0	8.7	60.9
VERTEBRATE FOSSILS (N=55)	20.0	45.5	0.0	9.1	0.0	45.5
INVERTEBRATE FOSSILS (N=62)	16.1	40.0	0.0	0.0	0.0	60.0
INVERTEBRATES (N=75)	17.3	38.5	0.0	0.0	7.7	53.8
ENTOMOLOGY (N=176)	19.9	54.3	2.9	0.0	0.0	42.9
BOTANY (N=302)	16.2	31.4	0.0	0.0	3.9	64.7
MICROBIOLOGY (N=70)	15.7	27.3	45.5	0.0	0.0	27.3
AVERAGE	15.2	31.7	8.8	0.9	4.3	54.3

[1] Based on the total responses to the survey.
[2] Based on the total responses to the question.
[3] State grants/contract programs, institutional research grants, United States Forest Service (USDA), private foundations.

TABLE 105A: Frequency distributions of sources of collection maintenance budgets, according to discipline-area (respondents could indicate more than one source).

DISCIPLINE-AREA	GOVERNMENT				PRIVATE SOURCES	ENDOWMENTS	FOUNDATIONS	SERVICE FEES	OTHER[1/]	TOTAL
	Federal	State	County	Municipal						
MAMMALOGY (N=127)	20	76	3	3	14	10	3	3	18	150
ORNITHOLOGY (N=114)	13	54	1	6	21	19	3	4	11	132
HERPETOLOGY (N=69)	8	48	1	4	4	10	3	1	16	95
ICHTHYOLOGY (N=92)	17	65	3	1	7	7	7	2	14	123
VERTEBRATE FOSSILS (N=55)	10	30	4	2	11	12	4	3	9	85
INVERTEBRATE FOSSILS (N=62)	5	34	3	2	13	7	1	0	8	73
INVERTEBRATES (N=75)	16	39	2	0	5	5	3	0	4	74
ENTOMOLOGY (N=176)	42	80	6	2	28	9	8	3	35	213
BOTANY (N=302)	66	145	7	4	42	18	11	9	49	351
MICROBIOLOGY (N=70)	34	32	1	0	4	0	0	6	9	86
TOTAL	197	603	31	24	149	97	43	31	173	1382

1/Curator's personal donations, department budget, income from personal consulting.

TABLE 105B: Sources of collection maintenance budgets, according to discipline-area (percentages based on total responses).

DISCIPLINE-AREA	GOVERNMENT				PRIVATE SOURCES	ENDOWMENTS	FOUNDATIONS	SERVICE FEES	OTHER 1/
	Federal	State	County	Municipal					
MAMMALOGY (N=127)	13.3	50.7	2.0	2.0	9.3	6.7	2.0	2.0	12.0
ORNITHOLOGY (N=114)	9.8	40.9	0.8	4.5	15.9	14.4	2.3	3.0	8.3
HERPETOLOGY (N=69)	8.4	50.5	1.1	4.2	4.2	10.5	3.2	1.1	16.8
ICHTHYOLOGY (N=92)	13.8	52.8	2.4	0.8	5.7	5.7	5.7	1.6	11.4
VERTEBRATE FOSSILS (N=55)	11.8	35.3	4.7	2.4	12.9	14.1	4.7	3.5	10.6
INVERTEBRATE FOSSILS (N=62)	6.8	46.6	4.1	2.7	17.8	9.6	1.4	0.0	11.0
INVERTEBRATES (N=75)	21.6	52.7	2.7	0.0	6.8	6.8	4.1	0.0	5.4
ENTOMOLOGY (N=176)	19.7	37.6	2.8	0.9	13.1	4.2	3.8	1.4	16.4
BOTANY (N=302)	18.8	41.3	2.0	1.1	12.0	5.1	3.1	2.6	14.0
MICROBIOLOGY (N=70)	39.5	37.2	1.2	0.0	4.7	0.0	0.0	7.0	10.5
AVERAGE	14.3	43.6	2.2	1.7	10.8	7.0	3.1	2.2	12.5

1/Curator's personal donations, department budget, income from personal consulting.

TABLE 105C: Frequency distributions of collection maintenance budgets by source of support within discipline-areas.

DISCIPLINE-AREA	SOURCE OF SUPPORT	FREQUENCY CLASSES (Percent of Budget) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL FREQUENCY COUNT
MAMMALOGY	Federal	5	2	1	2	2	0	0	0	0	8	20
	State	0	2	0	0	4	1	2	1	1	65	76
	County	0	1	0	0	0	0	0	0	0	2	3
	Municipal	1	1	0	1	0	0	0	0	0	0	3
	Private	3	1	0	0	2	1	1	0	1	5	14
	Endowments	1	3	2	0	0	1	0	0	1	2	10
	Foundations	1	1	0	0	0	0	0	0	0	1	3
	Service Fees	1	1	1	0	0	0	0	0	0	0	3
	Other[1/]	3	1	0	1	2	1	0	0	0	10	18
ORNITHOLOGY	Federal	1	1	1	3	1	0	0	0	1	5	13
	State	1	1	0	0	1	0	0	1	2	48	54
	County	0	0	0	0	0	0	0	0	0	1	1
	Municipal	1	2	0	0	0	0	0	1	0	2	6
	Private	7	1	3	1	3	1	0	0	1	4	21
	Endowments	2	1	1	1	3	2	0	3	1	5	19
	Foundations	1	1	0	0	0	0	0	0	0	1	3
	Service Fees	3	0	0	0	1	0	0	0	0	0	4
	Other[1/]	2	1	0	1	0	1	0	0	0	6	11
HERPETOLOGY	Federal	4	0	2	1	0	0	0	0	0	1	8
	State	1	1	0	0	1	0	0	0	1	44	48
	County	0	0	0	0	0	0	0	0	0	1	1
	Municipal	2	0	2	0	0	0	0	0	0	0	4
	Private	1	0	0	1	2	0	0	0	0	0	4
	Endowments	1	1	1	0	1	2	1	0	0	3	10
	Foundations	1	1	0	0	0	0	0	0	0	1	3
	Service Fees	1	0	0	0	0	0	0	0	0	0	1
	Other[1/]	6	1	0	1	1	1	1	0	1	4	16
ICHTHYOLOGY	Federal	2	1	0	2	2	1	0	3	0	6	17
	State	3	1	2	1	1	3	0	0	2	52	65
	County	0	0	0	0	0	1	0	1	0	1	3
	Municipal	0	0	1	0	0	0	0	0	0	0	1
	Private	3	0	0	0	2	1	0	0	0	1	7
	Endowments	2	2	1	0	0	0	0	1	0	1	7
	Foundations	2	1	0	1	0	0	1	0	0	2	7
	Service Fees	0	1	0	0	1	0	0	0	0	0	2
	Other[1/]	3	3	3	1	1	0	0	1	0	2	14
VERTEBRATE FOSSILS	Federal	1	0	2	0	1	0	0	1	1	4	10
	State	0	1	0	0	2	0	1	3	1	22	30
	County	0	2	1	0	0	0	0	0	1	0	4
	Municipal	0	0	0	0	0	0	0	2	0	0	2
	Private	5	1	0	2	2	0	0	1	0	0	11
	Endowments	7	1	0	0	1	1	0	1	0	1	12
	Foundations	1	2	0	1	0	0	0	0	0	0	4
	Service Fees	2	0	0	0	1	0	0	0	0	0	3
	Other[1/]	3	0	0	1	0	0	0	0	1	4	9

[1/]Curator's personal donations, department budgets, income from personal consulting.

TABLE 105C Continued: Frequency distributions of collection maintenance budgets by source of support within discipline-areas.

DISCIPLINE-AREA	SOURCE OF SUPPORT	FREQUENCY CLASSES (Percent of Budget) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	TOTAL FREQUENCY COUNT
INVERTEBRATE FOSSILS	Federal	3	0	0	0	0	0	0	0	1	1	5
	State	0	0	0	0	3	0	0	1	3	27	34
	County	0	1	0	0	0	0	0	0	0	2	3
	Municipal	0	1	0	0	0	0	0	0	0	1	2
	Private	6	1	0	1	1	0	0	1	0	3	13
	Endowments	1	1	2	0	2	0	0	0	0	1	7
	Foundations	0	0	1	0	0	0	0	0	0	0	1
	Service Fees	0	0	0	0	0	0	0	0	0	0	0
	Other[1/]	4	0	0	0	1	0	0	1	0	2	8
INVERT-EBRATES	Federal	5	0	0	1	1	1	0	0	1	7	16
	State	1	2	1	0	1	1	0	0	4	29	39
	County	0	0	0	0	0	0	0	0	0	2	2
	Municipal	0	0	0	0	0	0	0	0	0	0	0
	Private	3	0	0	0	0	0	0	1	0	1	5
	Endowments	1	0	0	0	1	0	0	0	1	2	5
	Foundations	1	0	0	0	0	0	1	0	0	1	3
	Service Fees	0	0	0	0	0	0	0	0	0	0	0
	Other[1/]	1	0	0	0	1	0	1	0	0	1	4
ENTOMOLOGY	Federal	6	5	5	6	3	3	1	2	0	11	42
	State	1	3	1	3	1	3	2	8	4	54	80
	County	0	0	1	0	0	0	0	0	2	3	6
	Municipal	0	0	0	0	1	0	0	0	0	1	2
	Private	6	4	0	1	2	2	0	1	0	12	28
	Endowments	2	2	0	1	2	0	0	0	0	2	9
	Foundations	3	1	0	0	1	1	0	0	0	2	8
	Service Fees	3	0	0	0	0	0	0	0	0	0	3
	Other[1/]	2	2	0	1	2	2	0	2	1	23	35
BOTANY	Federal	8	4	2	4	4	2	1	2	0	39	66
	State	1	1	2	1	4	0	2	3	10	121	145
	County	1	1	0	0	1	0	0	1	0	3	7
	Municipal	0	0	2	0	0	0	0	1	0	1	4
	Private	11	4	4	2	5	2	0	1	3	10	42
	Endowments	0	5	2	2	1	1	1	0	0	6	18
	Foundations	2	2	0	0	2	0	0	1	0	4	11
	Service Fees	6	1	0	1	0	0	0	0	0	1	9
	Other[1/]	6	1	2	2	5	2	0	1	3	27	49
MICROBIOLOGY	Federal	1	0	1	1	3	0	1	3	4	20	34
	State	5	1	2	0	3	0	1	3	3	14	32
	County	0	0	0	0	0	1	0	0	0	0	1
	Municipal	0	0	0	0	0	0	0	0	0	0	0
	Private	2	0	1	0	1	0	0	0	0	0	4
	Endowments	0	0	0	0	0	0	0	0	0	0	0
	Foundations	0	0	0	0	0	0	0	0	0	0	0
	Service Fees	3	0	1	1	0	1	0	0	0	0	6
	Other[1/]	1	0	2	0	1	0	0	0	0	5	9

[1/]Curator's personal donations, department budgets, income from personal consulting.

TABLE 106A: Number of grants awarded for General Operating Support of collections by source, according to discipline-area.

PURPOSE OF AWARD	SOURCE OF AWARD	DISCIPLINE-AREA: MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Personnel	NSF	5	7	5	9	7
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	1	0	0
	OTHER[1/]	9	2	3	12	7
Non-Personnel[2/]						
	NSF	3	2	1	4	2
	NIH	0	0	0	0	0
	NMA	0	0	1	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	4	6	0	4	4

TABLE 106A Continued: Number of grants awarded for General Operating Support of collections by source, according to discipline-area.

PURPOSE OF AWARD	SOURCE OF AWARD	DISCIPLINE-AREA: INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Personnel	NSF	1	3	8	12	4
	NIH	0	0	0	1	5
	NMA	0	0	0	0	0
	FWS	0	0	0	1	0
	OTHER[1/]	10	9	14	20	6
Non-Personnel[2/]						
	NSF	2	1	6	6	0
	NIH	0	0	0	0	3
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	2	7	10	11	6

[1/] Institutional discretionary funds, state grants programs, institutional research grants, Institute of Museum Services, Comprehensive Employment Training Act (CETA), private foundations, private individuals.

[2/] Supplies, travel, equipment, contract work.

TABLE 106B: Number of grants awarded for Special Support of collections by source, according to discipline-area.

PURPOSE OF AWARD	SOURCE OF AWARD	MAMMALOGY (N=127)	ORNITHOLOGY (N=114)	HERPETOLOGY (N=69)	ICHTHYOLOGY (N=92)	VERTEBRATE FOSSILS (N=55)
Storage Equipment	NSF	2	1	2	4	4
	NIH	1	0	1	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	1	2	1	2	1
Computerization of Collection	NSF	4	1	1	1	3
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	5	4	6	4	2
Emergency/Special Assistance	NSF	0	1	0	2	0
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	1	2	0	1	2
Establishment/ Development of Resource Facility	NSF	1	0	2	3	1
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	3	1	3	4	2
Reconstruction/ Renovation	NSF	1	1	4	3	2
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	5	3	1	4	5
Relocation/Consolidation of Collection	NSF	4	1	1	4	3
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	1	0	2	2	2
Special Equipment	NSF	1	0	1	4	4
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	1	0	0
	OTHER[1/]	4	1	0	6	2
Update/Revision of Specimen Data	NSF	2	2	3	2	4
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	1	0	0	3	3
Other[2/]	NSF	1	2	1	1	2
	NIH	0	0	0	1	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1/]	2	5	0	6	3

[1/] Institutional discretionary funds, state grants programs, Institutional research grants, Institute of Museum Services, Comprehensive Employment Training Act (CETA), private foundations, private individuals.

[2/] Supplies, cataloguing, contract work, reprint costs.

TABLE 106B Continued: Number of grants awarded for Special Support of collections by source, according to discipline-area.

PURPOSE OF AWARD	SOURCE OF AWARD	INVERTEBRATE FOSSILS (N=62)	INVERTEBRATES (N=75)	ENTOMOLOGY (N=176)	BOTANY (N=302)	MICROBIOLOGY (N=70)
Storage Equipment	NSF	2	3	7	2	0
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	1	0	0	0
	OTHER[1]	2	0	2	14	0
Computerization of Collection	NSF	1	3	0	2	1
	NIH	0	0	1	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	3	6	1	10	3
Emergency/Special Assistance	NSF	0	0	0	1	0
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	1	1	0	1	0
Establishment/ Development of Resource Facility	NSF	0	0	2	1	1
	NIH	0	1	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	1	1	1	7	0
Reconstruction/ Renovation	NSF	0	3	0	0	0
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	2	1	5	6	1
Relocation/Consolidation of Collection	NSF	0	0	0	1	0
	NIH	0	0	0	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	2	1	2	2	0
Special Equipment	NSF	1	1	7	4	3
	NIH	0	1	0	0	3
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	1	4	6	5	5
Update/Revision of Specimen Data	NSF	0	2	4	2	0
	NIH	0	0	1	0	0
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	1	1	5	6	0
Other[2]	NSF	1	3	0	3	0
	NIH	0	0	0	0	1
	NMA	0	0	0	0	0
	FWS	0	0	0	0	0
	OTHER[1]	4	2	7	10	2

[1] Institutional discretionary funds, state grants programs, institutional research grants, Institute of Museum Services, Comprehensive Employment Training Act (CETA), private foundations, private individuals.

[2] Supplies, cataloguing, contract work, reprint costs.

TABLE 107: Collection support grant proposals declined between 1976 and 1981, according to discipline-area.

DISCIPLINE-AREA	GRANT PROPOSALS DECLINED, ACCORDING TO RESPONSES[1] N	%	PERCENT OF THOSE DECLINED ACCORDING TO SOURCE OF PROSPECTIVE FUNDING[2] NSF	NIH	NMA	FWS	OTHER[3]
MAMMALOGY (N=127)	19	15.0	21.1	0.0	10.5	0.0	73.7
ORNITHOLOGY (N=114)	19	16.7	10.5	0.0	0.0	0.0	89.5
HERPETOLOGY (N=69)	12	17.4	8.3	0.0	0.0	0.0	91.7
ICHTHYOLOGY (N=92)	17	18.5	23.5	0.0	0.0	5.9	70.6
VERTEBRATE FOSSILS (N=55)	10	18.2	50.0	0.0	0.0	0.0	50.0
INVERTEBRATE FOSSILS (N=62)	10	16.1	30.0	0.0	0.0	0.0	70.0
INVERTEBRATES (N=75)	13	17.3	38.5	0.0	7.7	7.7	46.2
ENTOMOLOGY (N=176)	37	21.0	37.8	0.0	2.7	0.0	59.5
BOTANY (N=302)	49	16.2	22.4	0.0	0.0	4.1	73.5
MICROBIOLOGY (N=70)	9	12.9	0.0	33.3	0.0	0.0	66.7
TOTAL/PERCENT (N=1142)	195	17.1	24.2	3.3	2.1	1.8	69.1

Sources of Support for Research and Facilities in Systematics

The primary mechanisms to finance research, according to respondents, are grants (50%) and personal income (50%), the third most common source of funds for research coming from job-related activities (38%). Respondents could indicate more than one source of support (Table 108).

Between 1977 and 1982, 3,246 grants were awarded to 58% (1,487) of the respondents. Grant recipient respondents received an average of 2.2 awards during this five year period (Table 109). Of the 3,246 grants reported, funding levels were provided on 3,026 awards totalling roughly $165,000,000. The greatest amount of grant funds went to Botany (over $47,000,000). The least amounts went to Vertebrate Fossils, Invertebrate Fossils, and Ornithology (less than $5,000,000 per discipline-area). Overall, 56% of the number of grants were from federal agencies. Based on total dollars awarded, federal agencies provided 82% of the funding. Based on the number of grants, the five major sources in descending order are: the NSF (27.1%), Institutional (15.0%), Private Sector (11.7%), State, County, and Local Government (6.6%), and Department of the Interior (6.2%). Based on dollars awarded, the five principal sources of support are: the NSF (39.6%); NIH (10.7%); State, County, and Local Government (6.4%); Industry (5.6%); and Department of Interior (5.3%) (Tables 110A and 110B).

Escherich and McManus's, Sources of Federal Funding for Biological Research: 1983; Association of Systematics Collections, 83 pages), a published report, is attached as Appendix III. The report is an outgrowth of a survey of financial resources available to the systematic biology community. The report shows that nearly $3.5 billion was budgeted by federal agencies (independent of the NSF) for biological research in 1982. It also provides funding information on some 34 agencies and programs.

TABLE 108: Methods used to finance research, according to discipline-area.*

DISCIPLINE-AREA	GRANTS N	GRANTS %	CONTRACTS N	CONTRACTS %	PERSONAL INCOME N	PERSONAL INCOME %	JOB RELATED N	JOB RELATED %	OTHER N	OTHER %
MAMMALOGY (N=166)	94	56.63	25	15.06	90	54.22	77	46.39	20	12.05
ORNITHOLOGY (N=78)	44	56.41	18	23.08	43	55.13	27	34.62	11	14.10
HERPETOLOGY (N=259)	136	52.51	38	14.67	180	69.50	82	31.66	23	8.88
ICHTHYOLOGY (N=180)	99	55.00	55	30.56	76	42.22	70	38.89	17	9.44
VERTEBRATE FOSSILS (N=74)	44	59.46	10	13.51	44	59.46	34	45.95	9	12.16
INVERTEBRATE FOSSILS (N=47)	25	53.19	4	8.51	23	48.94	23	48.94	4	8.51
INVERTEBRATES (N=385)	175	45.45	58	15.06	188	48.83	144	37.40	37	9.61
ENTOMOLOGY (N=501)	211	42.20	40	8.00	259	51.80	217	43.40	37	7.40
BOTANY (N=730)	393	53.84	88	12.05	356	48.77	267	36.58	65	8.90
MICROBIOLOGY (N=53)	37	69.81	9	16.98	8	15.09	14	26.42	8	15.09
OTHER (N=82)	24	29.27	16	19.51	16	19.51	24	29.27	7	8.54
TOTAL (N=2555)	1282	50.17	361	14.12	1283	50.21	979	38.31	238	9.31

* Respondents could indicate more than one source.

TABLE 109: Number of grants/contracts awarded to individuals between 1977 and 1982, according to discipline-area.

DISCIPLINE-AREA	GRANT/CONTRACT RECIPIENTS N	%	NUMBER AWARDED	RATIO AWARDS/RECIP.	NUMBER REPORTING AMOUNT OF AWARD	TOTAL REPORTED AWARDS	MEAN	STANDARD DEVIATION
MAMMALOGY (N=166)	103	62.05	238	2.31	227	10,677,144	47,035.88	213,703.17
ORNITHOLOGY (N=78)	56	71.79	131	2.34	126	4,039,341	32,058.26	67,041.12
HERPETOLOGY (N=259)	151	58.30	327	2.17	315	10,774,193	34,203.79	84,791.21
ICHTHYOLOGY (N=180)	126	70.00	298	2.37	275	21,564,012	78,414.59	207,084.32
VERTEBRATE FOSSILS (N=74)	48	64.86	106	2.21	100	3,402,963	34,029.63	67,754.10
INVERTEBRATE FOSSILS (N=47)	30	63.83	61	2.03	50	1,504,000	30,080.00	32,662.35
INVERTEBRATES (N=385)	222	57.66	484	2.18	451	28,979,432	64,225.95	154,861.95
ENTOMOLOGY (N=501)	238	57.31	471	1.98	428	20,178,385	47,145.76	99,972.72
BOTANY (N=730)	440	60.27	969	2.22	916	47,485,171	51,839.71	127,083.85
MICROBIOLOGY (N=53)	39	73.58	93	2.38	84	10,085,486	120,065.31	111,124.43
OTHER (N=82)	34	41.46	68	2.00	54	6,768,400	125,340.74	237,339.58
TOTAL (N=2555)	1487	58.20	3246	2.18	3026	165,458,527	--	--

TABLE 110A: Summary of grant sources reported by respondents, according to number of grants awarded and total dollars awarded.

SOURCE OF FUNDING	NUMBER AWARDS	PERCENT[1/]	TOTAL DOLLARS	PERCENT[2/]
FEDERAL GOVERNMENT				
General	36	1.11	4,283,700	2.59
Dept. of Agriculture	185	5.70	8,321,781	5.03
Dept. of Commerce	104	3.20	5,857,159	3.54
Dept. of Defense	82	2.53	4,394,639	2.66
Dept. of Energy and Nuclear Reg. Comm.	48	1.48	8,235,448	4.98
Dept. of Health, Education and Welfare	4	0.12	325,000	0.20
National Institutes of Health	117	3.60	17,696,346	10.70
Dept. of Interior	200	6.16	8,733,155	5.28
Dept. of State	16	0.49	2,737,500	1.65
Environmental Protection Agency	41	1.26	6,317,806	3.82
Institute of Museum Services	10	0.31	327,460	0.20
National Academy of Sciences	7	0.22	92,065	0.06
National Air and Space Administration	7	0.22	286,000	0.17
National Endow. for Arts/Humanities	6	0.18	269,250	0.16
National Science Foundation	880	27.11	65,609,862	39.65
Smithsonian Institution	78	2.40	1,548,899	0.94
Subtotal	1821	56.09	135,036,070	81.61
STATE/COUNTY/LOCAL GOVT.	213	6.56	10,637,267	6.43
INSTITUTIONAL	487	15.00	1,898,493	1.15
PRIVATE SECTOR (not-for-profit)	379	11.68	4,942,627	2.99
INDUSTRY	120	3.70	9,307,939	5.63
FOREIGN/INTERNATIONAL	42	1.29	967,950	0.59
MISCELLANEOUS (including unknown sources)	184	5.67	2,668,181	1.61
TOTAL	3246	99.99	165,458,527	100.03

[1/]Based on total grants awarded (N=3,246).

[2/]Based on total dollars reported by respondents (N=3,026).

TABLE 110B: Sources of grants reported by respondents, according to discipline-area.

SOURCES OF FUNDING	MAMMALOGY (N=166)	ORNITHOLOGY (N=78)	HERPETOLOGY (N=259)	ICHTHYOLOGY (N=180)	VERTEBRATE FOSSILS (N=74)
FEDERAL GOVERNMENT					
General	5	1	4	7	
Dept. of Agriculture				2	
National Forest Service	8	8	10	5	1
Dept. of Commerce				1	
Federal Highway Dept.				1	
National Marine Fisheries			3	7	
National Ocean. Atmo. Admin.				1	
SEA Grant		1		9	
Dept. of Defense				2	
Air Force		1			
Army				2	
Corps of Engineers			9	4	1
Navy			3	6	
Dept. of Energy/Nuc. Reg Comm.	5	3	6	6	
Dept. of Interior		1	5	9	
Bureau of Land Management	1	5	7	4	1
Bureau of Reclamation				1	1
Fish and Wildlife Service	9	7	20	22	1
National Park Service	2	4	3	3	
Dept. of State			1	1	
World Bank				2	
Environmental Protect. Agency			1	5	
National Academy of Sciences	1		1		
National Aero. Space Admin.			1	2	
National Endow. Arts/Humanities			1		2
National Institutes of Health	15	1	7		1
National Science Foundation	41	23	72	66	33
Smithsonian Institution	13		4	5	3
National Museum Act	3		2	2	
STATE/COUNTY/LOCAL GOVERNMENT	25	17	17	43	2
PRIVATE SECTOR					
Conservation Organization	9	3	10	2	2
National Geographic Society	8	8	4	3	20
Non-Profit Organization	1		1		
Private Individual/Foundation	18	1	26	18	11
Scholarly Society	8	3	11	2	2
Sigma Xi	7	1	9	5	2
INSTITUTIONAL	40	29	64	29	11
INDUSTRY					
General	3	2	7	5	7
Utility	2		3	4	
FOREIGN/INTERNATIONAL					
General	2		2	1	1
Foreign Money (PL480)		1			2
World Health & Food Ag. Org.	1				
MISCELLANEOUS/UNKNOWN	11	11	13	11	2
TOTAL	238	131	327	298	106

TABLE 110B Continued: Sources of grants reported by respondents, according to discipline-area.

SOURCES OF FUNDING	FOSSILS (N=47)	INVERT. INVERTEBRATES (N=385)	ENTOMOLOGY (N=501)	BOTANY (N=730)	MICROBIOLOGY (N=53)	OTHER (N=82)
FEDERAL GOVERNMENT						
General		5	5	9		
Dept. of Agriculture		16	39	58	7	2
National Forest Service			3	23	2	1
Dept. of Commerce	1	1	2			
National Marine Fisheries		8				1
National Ocean. Atmo. Admin.		24			2	1
SEA Grant		19		17	1	4
Dept. of Defense						
Air Force		1				
Army			5	9	1	1
Corps of Engineers		16	4	5		
Navy		4	2	4	1	1
Dept. of Energy/Nuc. Reg. Comm.		6	4	14	3	1
Dept. of Health, Ed. & Welfare				1		3
National Institutes of Health		33	21	12	23	4
Dept. of Interior			5	6	4	
Bureau of Land Management		2	2	6		1
Bureau of Reclamation		1				
Fish and Wildlife Service		9	3	22		
National Park Service		9	1	17		
U. S. Geological Survey			1	5		
Dept. of State: AID		1	1	8	2	
Environmental Protection Agency		3	6	14	7	5
Institute of Museum Services	4			4		2
National Academy of Science		1	3	1		
National Aero. Space Admin.				4		
National Endow. Arts/Humanities				3		
National Science Foundation	28	102	144	335	18	18
Smithsonian Institution		13	16	10		1
National Museum Act				6		
STATE/COUNTY/LOCAL GOVERNMENT	2	30	33	38	3	3
INSTITUTIONAL	10	66	78	159		1
PRIVATE SECTOR						
Conservation Organization	2	6	4	5		
National Geographic Society		4	9	7		
Non-Profit Organization		1	4	6		1
Private Individual/Foundation	2	22	9	33	2	3
Scholarly Society	3	2	8	14		1
Sigma Xi		6	9	21		
INDUSTRY						
General	1	24	14	29	8	4
Utility		3	1	3		
FOREIGN/INTERNATIONAL						
General	1	3	2	12	2	
Foreign Money (PL480)			1			
World Health & Food Ag. Org.		2	2	3	4	
MISCELLANEOUS/UNKNOWN	7	41	30	46	3	9
TOTAL	61	484	471	969	93	68

Overview of Grant Programs in the NSF (Division of Biotic Systems and Resources)

Funding According to Higher Taxa Studied

While a variety of programs in the NSF support research in systematics (Biological Oceanography, Stratigraphy and Paleontology, International Programs, Anthropology, etc.), the Division of Biotic Systems and Resources (BSR) is the primary source for competitive funding for research and facilities in systematic biology. All five programs in the Division (Systematic Biology, Population Biology and Physiological Ecology, Ecology, Ecosystem Studies, and Biological Research Resources) were found to support either research or facilities that contributed to a better understanding of the systematics of organisms. Differences among grant applications to these different programs often were more apparent in the language of the proposals than the objectives of the investigators. This was particularly true in proposals submitted to the Systematic Biology and the Population Biology and Physiological Ecology programs. Those programs contributing the least to systematics were Ecosystem Studies and Ecology.

During fiscal years 1980 and 1981, nearly 98% of the proposals submitted (both awarded and declined) to the Systematic Biology program addressed problems associated with taxonomic groups (Tables 111, 112, 113, and 114). Among the awarded proposals, about 48% of the funds were for botanical research, 45% for zoological research, and 4% for problems dealing with protozoa and bacteria. The proposals declined follow a similar pattern.

Based on random samples of proposals awarded by the Population Biology and Physiological Ecology program (30 and 40 in fiscal years 1980 and 1981, respectively), at least 95% addressed particular taxonomic groups. The majority of the funds awarded (75% to 80%) and those requested in declined proposals (62% to 74%) focused on zoological problems (Tables 115, 116, 117, and 118).

Research on vertebrates was the most often supported in fiscal years 1980 and 1981, with 44% and 49%, respectively, of the funds awarded being for research on mammals, birds, amphibians/reptiles, and fish. In fiscal years 1980 and 1981, 40% and 56% of the funds requested in the random samples of 26 and 30 declined proposals, respectively, were for research on vertebrates (Tables 117 and 118).

The Ecology program provided significant support for organism-oriented research. In fiscal years 1980 and 1981, 87% and 82% of the random samples of 36 and 34 awards, respectively, involved specific taxonomic groups, while 13% and 18% of the funding were for nontaxa-oriented studies (Tables 119 and 120). Again, the majority of the funds, about 60%, were awarded for ecological studies involving animals. Between 51% and 61% of the funds requested in the declined proposals were for animal-oriented studies (Tables 121 and 122). In the Ecology program, there is a relatively high percentage of funds awarded (24% and 30% in fiscal years 1980 and 1981, respectively) for studies involving intergroup interactions. The majority of these studies focused on insect-plant relationships. Declined proposals followed a similar pattern; however, a larger percentage of the funds requested was for intergroup studies.

In the Ecosystem Studies program, 23% and 18% (of samples of 24 and 25 project awards, respectively, in fiscal years 1980 and 1981) referenced particular groups of organisms (Tables 123 and 124). These percentages do not reflect funds awarded for Long-Term Ecological Research (an area of emphasis in the Ecosystem Studies program), a portion of which would be attributable to organism-oriented studies in most of the proposals. Declined proposals tended to place greater emphasis (42% of funds requested, 47% of proposals) on particular groups of organisms or interactions of particular groups of organisms (based on samples of 15 declines each in fiscal years 1980 and 1981) (Tables 125 and 126).

The Biological Research Resources (BRR) program, with an emphasis on research support facilities, was reviewed from the perspective of the taxonomic orientation of the facilities referenced in the proposals. Over 50% of the proposals awarded were for systematics collection facilities (Tables 127 and 128). Zoological collections received approximately 30% of the funding; botanical collections, 18% - 22%; living organism stock centers, 17% - 19%; and field stations, 11% - 18%. In fiscal year 1980, 18% of the funds awarded were temporarily placed in the BRR program but set aside in escrow and directed toward support of Long-Term Ecological Research. These funds were formally transferred to the Ecosystem Studies program in fiscal year 1981. The percentage distribution of dollars requested in declined proposals and the number of declined proposals in the BRR program is summarized in Tables 129 and 130.

TABLE 111A: Proportional distribution of dollars awarded in SYSTEMATIC BIOLOGY in fiscal year 1980, according to higher taxa studied (based on a sample of 236 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	497,042	6.4				
Birds	96,943	1.2				
Amphibians/Reptiles	429,051	5.5				
Fish	309,602	4.0				
Vertebrates, General	73,019	0.9				
Total Vertebrates			1,405,657	18.0		
Mollusks	151,842	1.9				
Insects	1,186,029	15.2				
Arachnids	76,907	1.0				
Invertebrates, Other	245,735	3.1				
Invertebrates, General	15,801	0.2				
Total Invertebrates			1,676,314	21.4		
Parasites of Animals	12,580	0.2	12,580	0.2		
Vertebrate Fossils	402,969	5.2				
Invertebrate Fossils	51,477	0.7				
Total Animal Fossils			454,446	5.9		
TOTAL ANIMALS					3,548,997	45.5
Higher Vascular Plants	1,603,653	20.5				
Lower Vascular Plants	189,424	2.4				
Vascular Plants, General	257,886	3.3				
Total Vascular Plants			2,050,963	26.2		
Fungi	361,121	4.6				
Algae	367,404	4.7				
Other Nonvascular Plants	229,017	2.9				
Total Nonvascular Plants			957,542	12.2		
Parasites of Plants	38,991	0.5	38,991	0.5		
Plant Fossils	504,748	6.5	504,748	6.5		
Plants, General	217,026	2.8	217,026	2.8		
TOTAL PLANTS					3,769,270	48.2
Protozoa	101,757	1.3	101,757	1.3	101,757	1.3
Bacteria	192,119	2.5	192,119	2.5	192,119	2.5
General Biology	203,705	2.6	203,705	2.6	203,705	2.6
TOTAL	7,815,848	100.0	7,815,848	100.0	7,815,848	100.0

TABLE 111B: Proportional distribution of awards in SYSTEMATIC BIOLOGY in fiscal year 1980, according to higher taxa studied (based on a sample of 236 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	12	5.1				
Birds	3	1.3				
Amphibians/Reptiles	14	5.9				
Fish	8	3.4				
Vertebrates, General	2	0.8				
Total Vertebrates			39	16.5		
Mollusks	5	2.1				
Insects	32	13.6				
Arachnids	3	1.3				
Invertebrates, Other	8	3.4				
Invertebrates, General	1	0.4				
Total Invertebrates			49	20.8		
Parasites of Animals	1	0.4	1	0.4		
Vertebrate Fossils	14	5.9				
Invertebrate Fossils	3	1.3				
Total Animal Fossils			17	7.2		
TOTAL ANIMALS					106	44.9
Higher Vascular Plants	58	24.6				
Lower Vascular Plants	6	2.5				
Vascular Plants, General	7	3.0				
Total Vascular Plants			71	30.1		
Fungi	10	4.2				
Algae	10	4.2				
Other Nonvascular Plants	3	1.3				
Total Nonvascular Plants			23	9.7		
Parasites of Plants	1	0.4	1	0.4		
Plant Fossils	13	5.5	13	5.5		
Plants, General	7	3.0	7	3.0		
TOTAL PLANTS					115	48.7
Protozoa	2	0.8	2	0.8	2	0.8
Bacteria	5	2.1	5	2.1	5	2.1
General Biology	8	3.4	8	3.4	8	3.4
TOTAL	236	100.0	236	100.00	236	100.00

TABLE 112A: Proportional distribution of dollars awarded in SYSTEMATIC BIOLOGY in fiscal year 1981, according to higher taxa studied (based on a sample of 241 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	483,291	6.0				
Birds	278,483	3.4				
Amphibians/Reptiles	522,803	6.5				
Fish	195,471	2.4				
Vertebrates, General	147,216	1.8				
Total Vertebrates			1,627,264	20.1		
Mollusks	145,007	1.8				
Insects	761,169	9.4				
Arachnids	129,061	1.6				
Invertebrates, General	275,854	3.4				
Total Invertebrates			1,311,091	16.2		
Vertebrate Fossils	435,215	5.4				
Invertebrate Fossils	223,543	2.8				
Total Animal Fossils			658,758	8.2		
Animals, General	80,000	1.0	80,000	1.0		
TOTAL ANIMALS					3,677,113	45.5
Higher Vascular Plants	1,785,986	22.1				
Lower Vascular Plants	53,246	0.7				
Vascular Plants, General	262,244	3.2				
Total Vascular Plants			2,101,476	26.0		
Fungi	500,718	6.2				
Algae	344,927	4.3				
Other Nonvascular Plants	243,615	3.0				
Total Nonvascular Plants			1,089,260	13.5		
Parasites of Plants	42,572	0.5	42,572	0.5		
Plant Fossils	479,555	5.9	479,555	5.9		
Plants, General	224,811	2.8	224,811	2.8		
TOTAL PLANTS					3,937,674	48.7
Protozoa	43,984	0.5	43,984	0.5	43,984	0.5
Bacteria	180,681	2.2	180,681	2.2	180,681	2.2
Nonassigned	146,529	1.8	146,529	1.8	146,529	1.8
General Biology	111,116	1.4	111,116	1.4	111,116	1.4
TOTAL	8,097,097	100.0	8,097,097	100.0	8,097,097	100.0

TABLE 112B: Proportional distribution of awards in SYSTEMATIC BIOLOGY, in fiscal year 1981, according to higher taxa studied (based on a sample of 241 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	13	5.4				
Birds	7	2.9				
Amphibians/Reptiles	13	5.4				
Fish	7	2.9				
Vertebrates, General	3	1.2				
Total Vertebrates			43	17.8		
Mollusks	6	2.5				
Insects	26	10.8				
Arachnids	4	1.7				
Invertebrates, General	9	3.7				
Total Invertebrates			45	18.7		
Vertebrate Fossils	9	3.7				
Invertebrate Fossils	6	2.5				
Total Animal Fossils			15	6.2		
Animals, General	1	0.4	1	0.4		
TOTAL ANIMALS					104	43.1
Higher Vascular Plants	62	25.7				
Lower Vascular Plants	3	1.2				
Vascular Plants, General	8	3.3				
Total Vascular Plants			73	30.2		
Fungi	12	5.0				
Algae	10	4.1				
Other Nonvascular Plants	6	2.5				
Total Nonvascular Plants			28	11.6		
Parasites of Plants	1	0.4	1	0.4		
Plant Fossils	12	4.9	12	4.9		
Plants, General	5	2.1	5	2.1		
TOTAL PLANTS					119	49.2
Protozoa	2	0.8	2	0.8	2	0.8
Bacteria	4	1.7	4	1.7	4	1.7
Nonassigned	7	2.9	7	2.9	7	2.9
General Biology	5	2.1	5	2.1	5	2.1
TOTAL	241	100.0	241	100.0	241	100.0

TABLE 113A: Proportional distribution of dollars requested in declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1980, according to higher taxa studied (based on a sample of 114 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	545,593	5.8				
Amphibians/Reptiles	724,155	7.7				
Fish	18,415	0.2				
Vertebrates, General	247,040	2.6				
Total Vertebrates			1,535,203	16.3		
Mollusks	290,598	3.1				
Insects	2,102,766	22.3				
Arachnids	99,120	1.1				
Invertebrates, General	155,191	1.6				
Total Invertebrates			2,647,675	28.1		
Parasites of Animals	192,599	2.0	192,599	2.0		
Vertebrate Fossils	241,639	2.6				
Animal Fossils, General	159,264	1.7				
Total Animal Fossils			400,903	4.3		
TOTAL ANIMALS					4,776,380	50.7
Higher Vascular Plants	2,040,437	21.7				
Lower Vascular Plants	185,107	2.0				
Vascular Plants, General	32,010	0.3				
Total Vascular Plants			2,257,554	24.0		
Fungi	484,546	5.1				
Algae	558,921	5.9				
Other Nonvascular Plants	52,581	0.6				
Nonvascular Plants, Genl.	50,979	0.5				
Total Nonvascular Plants			1,147,027	12.1		
Parasites of Plants	123,760	1.3	123,760	1.3		
Plant Fossils	120,811	1.3	120,811	1.3		
TOTAL PLANTS					3,649,152	38.7
Protozoa	83,246	0.9	83,246	0.9	83,246	0.9
Bacteria	565,443	6.0	565,443	6.0	565,443	6.0
General Biology	338,888	3.6	338,888	3.6	338,888	3.6
TOTAL	9,413,109	100.0	9,413,109	100.0	9,413,109	100.0

TABLE 113B: Proportional distribution of declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1980, according to higher taxa studied (based on a sample of 114 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	5	4.4				
Amphibians/Reptiles	9	7.9				
Fish	1	0.9				
Vertebrates, General	1	0.9				
Total Vertebrates			16	14.1		
Mollusks	5	4.4				
Insects	17	14.9				
Arachnids	2	1.8				
Invertebrates, General	2	1.8				
Total Invertebrates			26	22.9		
Parasites of Animals	1	0.9	1	0.9		
Vertebrate Fossils	5	4.4				
Animal Fossils, General	2	1.8				
Total Animal Fossils			7	6.2		
TOTAL ANIMALS					50	44.1
Higher Vascular Plants	35	30.7				
Lower Vascular Plants	3	2.5				
Vascular Plants, General	2	1.8				
Total Vascular Plants			40	35.0		
Fungi	6	5.3				
Algae	6	5.3				
Other Nonvascular Plants	1	0.9				
Nonvascular Plants, Genl.	1	0.9				
Total Nonvascular Plants			14	12.4		
Parasites of Plants	1	0.9	1	0.9		
Plant Fossils	1	0.9	1	0.9		
TOTAL PLANTS					56	49.2
Protozoa	2	1.8	2	1.8	2	1.8
Bacteria	3	2.5	3	2.5	3	2.5
General Biology	3	2.5	3	2.5	3	2.5
TOTAL	114	100.0	114	100.0	114	100.0

TABLE 114A: Proportional distribution of dollars requested in declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1981, according to higher taxa studied (based on a sample of 133 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	550,587	3.7				
Amphibians/Reptiles	372,251	2.5				
Fish	1,505,133	10.0				
Total Vertebrates			2,427,971	16.2		
Mollusks	29,356	0.2				
Insects	2,200,161	14.7				
Arachnids	151,968	1.0				
Invertebrates, General	404,478	2.7				
Total Invertebrates			2,785,963	18.6		
Vertebrate Fossils	351,824	2.3				
Invertebrate Fossils	164,054	1.1				
Total Animal Fossils			515,878	3.4		
Animals, General	85,922	0.6	85,922	0.6		
TOTAL ANIMALS					5,815,734	38.8
Higher Vascular Plants	4,432,821	29.5				
Lower Vascular Plants	163,391	1.1				
Vascular Plants, General	1,740	0.0				
Total Vascular Plants			4,597,952	30.6		
Fungi	1,395,461	9.3				
Algae	405,080	2.7				
Other Nonvascular Plants	118,462	0.8				
Total Nonvascular Plants			1,919,003	12.8		
Plant Fossils	190,873	1.3	190,873	1.3		
Plants, General	718,070	4.8	718,070	4.8		
TOTAL PLANTS					7,425,898	49.5
Protozoa	288,286	1.9	288,286	1.9	288,286	1.9
Bacteria	901,948	6.0	901,948	6.0	901,948	6.0
General Biology	572,937	3.8	572,937	3.8	572,937	3.8
TOTAL	15,004,803	100.0	15,004,803	100.0	15,004,803	100.0

TABLE 114B: Proportional distribution of declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1981, according to higher taxa studied (based on a sample of 133 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	5	3.8				
Amphibians/Reptiles	4	3.0				
Fish	11	8.3				
Total Vertebrates			20	15.1		
Mollusks	2	1.5				
Insects	18	13.5				
Arachnids	2	1.5				
Invertebrates, General	5	3.8				
Total Invertebrates			27	20.3		
Vertebrate Fossils	5	3.8				
Invertebrate Fossils	2	1.5				
Total Animal Fossils			7	5.3		
Animals, General	2	1.5	2	1.5		
TOTAL ANIMALS					56	42.2
Higher Vascular Plants	45	33.8				
Lower Vascular Plants	2	1.5				
Vascular Plants, General	1	0.8				
Total Vascular Plants			48	36.1		
Fungi	12	9.0				
Algae	4	3.0				
Other Nonvascular Plants	2	1.5				
Total Nonvascular Plants			18	13.5		
Plant Fossils	3	2.3	3	2.3		
Plants, General	4	3.0	4	3.0		
TOTAL PLANTS					73	54.9
Protozoa	1	0.8	1	0.8	1	0.8
Bacteria	1	0.8	1	0.8	1	0.8
General Biology	2	1.5	2	1.5	2	1.5
TOTAL	133	100.0	133	100.0	133	100.0

TABLE 115A: Proportional distribution of dollars awarded in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 30 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	188,953	16.20				
Birds	42,000	3.60				
Amphibians/Reptiles	135,012	11.57				
Fish	146,390	12.55				
Total Vertebrates			512,355	43.92		
Mollusks	253,620	21.74				
Insects	178,695	15.32				
Total Invertebrates			432,315	37.06		
TOTAL ANIMALS					944,670	80.98
Vascular Plants	208,180	17.85				
Total Vascular Plants			208,180	17.85		
TOTAL PLANTS					208,180	17.85
NONTAXA-ORIENTED STUDIES	13,644	1.17	13,644	1.17	13,644	1.17
TOTAL	1,166,494	100.00	1,166,494	100.00	1,166,494	100.00

TABLE 115B: Proportional distribution of awards in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 30 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	6	20.00				
Birds	1	3.33				
Amphibians/Reptiles	4	13.33				
Fish	3	10.00				
Total Vertebrates			14	46.66		
Invertebrates						
Mollusks	4	13.33				
Insects	4	13.33				
Total Invertebrates			8	26.66		
TOTAL ANIMALS					22	73.32
Vascular Plants	7	23.33				
Total Vascular Plants			7	23.33		
TOTAL PLANTS					7	23.33
NONTAXA-ORIENTED STUDIES	1	3.33	1	3.33	1	3.33
TOTAL	30	100.00	30	100.00	30	100.00

TABLE 116A: Proportional distribution of dollars awarded in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 40 awards).

HIGHER TAXA STUDIED	AWARDED DOLLARS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	388,633	24.64				
Birds	93,135	5.90				
Amphibians/Reptiles	240,347	15.24				
Fish	47,703	3.02				
Total Vertebrates			769,818	48.80		
Mollusks	128,573	8.15				
Insects	274,933	17.43				
Total Invertebrates			403,506	25.58		
TOTAL ANIMALS					1,173,324	74.38
Vascular Plants	276,001	17.50				
Total Vascular Plants			276,001	17.50		
Fungi	58,000	3.68				
Total Nonvascular Plants			58,000	3.68		
TOTAL PLANTS					334,001	21.18
NONTAXA-ORIENTED STUDIES	70,000	4.44	70,000	4.44	70,000	4.44
TOTAL	1,577,325	100.00	1,577,325	100.00	1,577,325	100.00

TABLE 116B: Proportional distribution of awards in the POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY Program in fiscal year 1981, according to higher taxa studied (based on a random sample of 40 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	7	17.50				
Birds	3	7.50				
Amphibians/Reptiles	7	17.50				
Fish	2	5.00				
Total Vertebrates			19	47.50		
Mollusks	3	7.50				
Insects	5	12.50				
Total Invertebrates			8	20.00		
TOTAL ANIMALS					27	67.50
Vascular Plants	10	25.00				
Total Vascular Plants			10	25.00		
Fungi	2	5.00				
Total Nonvascular Plants			2	5.00		
TOTAL PLANTS					12	30.00
NONTAXA-ORIENTED STUDIES	1	2.50	1	2.50	1	2.50
TOTAL	40	100.00	40	100.00	40	100.00

TABLE 117A: Proportional distribution of dollars requested in declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 26 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	352,397	12.23				
Birds	621,326	21.57				
Amphibians/Reptiles	60,958	2.12				
Fish	130,892	4.54				
Total Vertebrates			1,165,573	40.46		
Invertebrates	128,470	4.46				
Mollusks	106,594	3.70				
Insects	373,523	12.97				
Total Invertebrates			608,587	21.13		
TOTAL ANIMALS					1,774,160	61.59
Vascular Plants	720,465	25.01				
Total Vascular Plants			720,465	25.01		
Algae	117,544	4.08				
Total Nonvascular Plants			117,544	4.08		
TOTAL PLANTS					838,009	29.09
Protozoa	79,544	2.76	79,544	2.76	79,544	2.76
Bacteria	188,724	6.55	188,724	6.55	188,724	6.55
TOTAL	2,880,437	100.00	2,880,437	100.00	2,880,437	100.00

TABLE 117B: Proportional distribution of declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 26 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	3	11.54				
Birds	4	15.38				
Amphibians/Reptiles	1	3.85				
Fish	1	3.85				
Total Vertebrates			9	34.62		
Invertebrates	2	7.69				
Mollusks	1	3.85				
Insects	5	19.23				
Total Invertebrates			8	30.77		
TOTAL ANIMALS					17	65.39
Vascular Plants	6	23.08				
Total Vascular Plants			6	23.08		
Algae	1	3.85				
Total Nonvascular Plants			1	3.85		
TOTAL PLANTS					7	26.93
Protozoa	1	3.85	1	3.85	1	3.85
Bacteria	1	3.85	1	3.85	1	3.85
TOTAL	26	100.00	26	100.00	26	100.00

TABLE 118A: Proportional distribution of dollars requested in declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 30 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	626,859	21.17				
Birds	11,021	0.37				
Amphibians/Reptiles	228,503	7.72				
Fish	605,577	20.45				
Vertebrates, General	199,905	6.75				
Total Vertebrates			1,671,865	56.46		
Mollusks	117,910	3.98				
Insects	212,114	7.16				
Arachnids	186,525	6.30				
Total Invertebrates			516,549	17.44		
TOTAL ANIMALS					2,188,414	73.90
Vascular Plants	651,758	22.01				
Total Vascular Plants			651,758	22.01		
TOTAL PLANTS					651,758	22.01
NONTAXA-ORIENTED STUDIES	121,000	4.0 9	121,000	4.09	121,000	4.09
TOTAL	2,961,172	100.00	2,961,172	100.00	2,961,172	100.00

TABLE 118B: Proportional distribution of declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 30 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	6	20.00				
Birds	1	3.33				
Amphibians/Reptiles	3	10.00				
Fish	5	16.67				
Vertebrates, General	2	6.67				
Total Vertebrates			17	56.67		
Mollusks	1	3.33				
Insects	4	13.33				
Arachnids	1	3.33				
Total Invertebrates			6	19.99		
TOTAL ANIMALS					23	76.66
Vascular Plants	6	20.00				
Total Vascular Plants			6	20.00		
TOTAL PLANTS					6	20.00
NONTAXA-ORIENTED STUDIES	1	3.33	1	3.33	1	3.33
TOTAL	30	100.00	30	100.00	30	100.00

TABLE 119A: Proportional distribution of dollars awarded in ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 36 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Fish	170,928	11.2				
Total Vertebrates			170,928	11.2		
Mollusks	34,730	2.27				
Insects	71,054	4.65				
Arachnids	45,415	2.97				
Invertebrates, General	194,118	12.70				
Total Invertebrates			345,317	22.59		
Zoology, General	40,501	2.65	40,501	2.65		
TOTAL ANIMALS					556,746	36.44
Higher Vascular Plants	236,683	15.48				
Vascular Plants, General	50,556	3.31				
Total Vascular Plants			287,239	18.79		
Fungi	30,394	1.99				
Total Nonvascular Plants			30,484	2.00		
Plant Fossils	84,965	5.56	84,965	5.56		
TOTAL PLANTS					402,688	26.35
Bacteria	5,800	0.38	5,800	0.38	5,800	0.38
Birds/Hi. Vascular Plants	58,995	3.86				
Invertebrates/Algae	63,978	4.19				
Insects/Hi. Vasc. Plants	242,177	15.84				
Fungi/Hi. Vascular Plants	90	0.01				
TOTAL INTERGROUP STUDIES			365,240	23.90	365,240	23.90
NONTAXA-ORIENTED STUDIES	198,331	12.97	198,331	12.98	198,331	12.97
TOTAL	1,528,715	100.00	1,528,715	100.00	1,528,715	100.00

TABLE 119B: Proportional distribution of awards in ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 36 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Fish	4	11.11				
Total Vertebrates			4	11.11		
Mollusks	1	2.78				
Insects	2	5.56				
Arachnids	1	2.78				
Invertebrates, General	3	8.33				
Total Invertebrates			7	19.45		
Zoology, General	1	2.78	1	2.78		
TOTAL ANIMALS					12	33.34
Higher Vascular Plants	6	16.67				
Vascular Plants, General	1	2.78				
Total Vascular Plants			7	19.45		
Fungi	1	2.78				
Total Nonvascular Plants			1	2.78		
Plant Fossils	2	5.56	2	5.56		
TOTAL PLANTS					11	27.79
Bacteria	1	2.78	1	2.78	1	2.78
Birds/Hi. Vascular Plants	1	2.78				
Invertebrates/Algae	1	2.78				
Insects/Hi. Vasc. Plants	6	16.67				
Fungi/Hi. Vascular Plants	1	2.78				
TOTAL INTERGROUP STUDIES			9	25.01	9	25.01
NONTAXA-ORIENTED STUDIES	4	11.11	4	11.11	4	11.11
TOTAL	36	100.00	36	100.00	36	100.00

TABLE 120A: Proportional distribution of dollars awarded in ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 34 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Birds	56,473	4.55				
Fish	134,163	10.82				
Vertebrates, General	37,883	3.06				
Total Vertebrates			228,519	18.43		
Mollusks	26,170	2.11				
Insects	164,901	13.30				
Arachnids	4,520	0.36				
Invertebrates, General	20,598	1.66				
Total Invertebrates			216,189	17.43		
Zoology, General	5,350	0.43	5,350	0.43		
TOTAL ANIMALS					450,058	36.29
Higher Vascular Plants	62,341	5.03				
Vascular Plants, General	64,690	5.22				
Total Vascular Plants			127,031	10.25		
Plant Fossils	65,116	5.25	65,116	5.25		
TOTAL PLANTS					192,147	15.50
Birds/Hi. Vascular Plants	60,911	4.91				
Invertebrates/Algae	96,305	7.77				
Insects/Hi. Vasc. Plants	153,987	12.42				
Fungi/Hi. Vascular Plants	61,267	4.94				
TOTAL INTERGROUP STUDIES			372,470	30.04	372,470	30.04
NONTAXA-ORIENTED STUDIES	225,271	18.17	225,271	18.17	225,271	18.17
TOTAL	1,239,946	100.00	1,239,946	100.00	1,239,946	100.00

TABLE 120B: Proportional distribution of awards in ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 34 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Birds	2	5.88				
Fish	4	11.76				
Vertebrates, General	1	2.94				
Total Vertebrates			7	20.58		
Mollusks	1	2.94				
Insects	6	17.65				
Arachnids	1	2.94				
Invertebrates, General	2	5.88				
Total Invertebrates			10	29.41		
Zoology, General	1	2.94	1	2.94		
TOTAL ANIMALS					18	52.93
Higher Vascular Plants	2	5.88				
Vascular Plants, General	1	2.94				
Total Vascular Plants			3	8.82		
Plant Fossils	1	2.94	1	2.94		
TOTAL PLANTS					4	11.76
Birds/Hi. Vascular Plants	1	2.94				
Invertebrates/Algae	2	5.88				
Insects/Hi. Vasc. Plants	3	8.82				
Fungi/Hi. Vascular Plants	1	2.94				
TOTAL INTERGROUP STUDIES			7	20.58	7	20.58
NONTAXA-ORIENTED STUDIES	5	14.71	5	14.71	5	14.71
TOTAL	34	100.00	34	100.00	34	100.00

TABLE 121A: Proportional distribution of dollars requested in declined proposals in ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 15 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Mammals	58,789	2.67				
Amphibians/Reptiles	77,197	3.51				
Total Vertebrates			135,986	6.18		
TOTAL ANIMALS					135,986	6.18
Vascular Plants	5,200	0.24				
Total Vascular Plants			5,200	0.24		
Fungi	68,009	3.09				
Algae	487,719	22.19				
Total Nonvascular Plants			555,728	25.28		
Plants, General	178,208	8.11	178,208	8.11		
TOTAL PLANTS					739,136	33.63
Mammals/Plant Fossils	23,701	1.08				
Birds/Insects	77,753	3.54				
Mollusks/Algae	132,439	6.02				
Insects/Hi. Vasc. Plants	455,566	20.72				
Vertebrate Fossils/ Plant Fossils	292,529	13.31				
Fungi/Fungi	218,983	9.96				
TOTAL INTERGROUP STUDIES			1,200,971	54.63	1,200,971	54.63
NONTAXA-ORIENTED STUDIES	122,170	5.56	122,170	5.56	122,170	5.56
TOTAL	2,198,263	100.00	2,198,263	100.00	2,198,263	100.00

TABLE 121B: Proportional distribution of declined proposals in ECOLOGY in fiscal year 1980, according to higher taxa studied (based on a random sample of 15 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	TOTAL	PERCENT	SUB-TOTAL	PERCENT
Mammals	1	6.67				
Amphibians/Reptiles	1	6.67				
Total Vertebrates			2	13.34		
TOTAL ANIMALS					2	13.34
Vascular Plants	1	6.67				
Total Vascular Plants			1	6.67		
Fungi	1	6.67				
Algae	2	13.33				
Total Nonvascular Plants			3	20.00		
Plants, General	1	6.67	1	6.67		
TOTAL PLANTS					5	33.34
Mammals/Plant Fossils	1	6.67				
Birds/Insects	1	6.67				
Mollusks/Algae	1	6.67				
Insects/Hi. Vasc. Plants	2	13.33				
Vertebrate Fossils/Plant Fossils	1	6.67				
Fungi/Fungi	1	6.67				
TOTAL INTERGROUP STUDIES	7	46.68	7	46.68	7	46.68
NONTAXA-ORIENTED STUDIES	1	6.67	1	6.67	1	6.67
TOTAL	15	100.00	15	100.00	15	100.00

TABLE 122A: Proportional distribution of dollars requested in declined proposals in ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 25 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Birds	33,521	1.57				
Amphibians/Reptiles	345,804	16.24				
Fish	114,183	5.36				
Total Vertebrates			493.508	23.17		
Insects	5.556	0.26				
Total Invertebrates			5,556	0.26		
TOTAL ANIMALS					499,064	23.43
Higher Vascular Plants	500,169	23.49				
Vascular Plants, General	672	0.03				
Total Vascular Plants			500,841	23.52		
Plants, General	188,359	8.85	188,359	8.85		
TOTAL PLANTS					689,200	32.37
Mammals/Hi. Vasc. Plants	51,120	2.40				
Birds/Insects	421,678	19.81				
Insects/Hi. Vasc. Plants	154,686	7.27				
Insects/Protozoa	171,659	8.06				
TOTAL INTERGROUP STUDIES			799,143	37.54	799,143	37.54
NONTAXA-ORIENTED STUDIES	141,505	6.65	141,505	6.65	141,505	6.65
TOTAL	2,128,912	100.00	2,128,912	100.00	2,128,912	100.00

TABLE 122B: Proportional distribution of declined proposals in ECOLOGY in fiscal year 1981, according to higher taxa studied (based on a random sample of 25 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
Birds	1	4.00				
Amphibians/Reptiles	2	8.00				
Fish	2	8.00				
Total Vertebrates			5	20.00		
Insects	1	4.00				
Total Invertebrates			1	4.00		
TOTAL ANIMALS					6	24.00
Higher Vascular Plants	6	24.00				
Vascular Plants, General	1	4.00				
Total Vascular Plants			7	28.00		
Plants, General	2	8.00	2	8.00		
TOTAL PLANTS					9	36.00
Mammals/Hi. Vasc. Plants	1	4.00				
Birds/Insects	1	4.00				
Insects/Hi. Vasc. Plants	2	8.00				
Insects/Protozoa	1	4.00				
TOTAL INTERGROUP STUDIES			5	20.00	5	20.00
NONTAXA-ORIENTED STUDIES	5	20.00	5	20.00	5	20.00
TOTAL	25	100.00	25	100.00	25	100.00

TABLE 123A: Proportional distribution of dollars awarded in ECOSYSTEM STUDIES in fiscal year 1980, involving higher taxa (based on a sample of 24 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Plants, General	334,087	11.95		
Insects/Hi. Vascular Plants	220,852	7.90		
Animal Fossils/Plant Fossils	8,603	0.31		
Bacteria	80,815	2.89		
TOTAL TAXA-ORIENTED STUDIES			644,357	23.05
NONTAXA-ORIENTED STUDIES	2,055,401	73.53	2,055,401	73.53
LONG-TERM ECOLOGICAL RESEARCH	95,719	3.42	95,719	3.42
TOTAL	2,795,477	100.00	2,795,477	100.00

TABLE 123B: Proportional distribution of awards in ECOSYSTEM STUDIES in fiscal year 1980, involving higher taxa (based on a sample of 24 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Plants, General	3	12.50		
Insects/Hi. Vascular Plants	1	4.20		
Animal Fossils/Plant Fossils	1	4.20		
Bacteria	1	4.10		
TOTAL TAXA-ORIENTED STUDIES			6	25.00
NONTAXA-ORIENTED STUDIES	12	50.00	12	50.00
LONG-TERM ECOLOGICAL RESEARCH	6	25.00	6	25.00
TOTAL	24	100.00	24	100.00

TABLE 124A: Proportional distribution of dollars awarded in ECOSYSTEM STUDIES in fiscal year 1981, involving higher taxa (based on a sample of 25 awards).

HIGHER TAXA STUDIED	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Plants, General	470,364	11.03		
Insects/Hi. Vascular Plants	210,872	4.95		
Bacteria	80,730	1.89		
TOTAL TAXA-ORIENTED STUDIES			761,966	17.87
NONTAXA-ORIENTED STUDIES	1,749,767	41.04	1,749,767	41.04
LONG-TERM ECOLOGICAL RESEARCH	1,751,932	41.09	1,751,932	41.09
TOTAL	4,263,665	100.00	4,263,665	100.00

TABLE 124B: Proportional distribution of awards in ECOSYSTEM STUDIES in fiscal year 1981, involving higher taxa (based on a sample of 25 awards).

HIGHER TAXA STUDIED	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Plants, General	6	24.00		
Insects/Hi. Vascular Plants	1	4.00		
Bacteria	2	8.00		
TOTAL TAXA-ORIENTED STUDIES			9	36.00
NONTAXA-ORIENTED STUDIES	10	40.00	10	40.00
LONG-TERM ECOLOGICAL RESEARCH	6	24.00	6	24.00
TOTAL	25	100.00	25	100.00

TABLE 125A: Proportional distribution of dollars requested in declined proposals in ECOSYSTEM STUDIES in fiscal year 1980, involving higher taxa (based on a sample of 15 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Insects	1,450,807	26.17		
Algae	86,670	1.56		
Bacteria	131,557	2.37		
Insects/Hi. Vasc. Plants	307,050	5.54		
Bacteria/Protozoa/Plants	377,066	6.81		
TOTAL TAXA-ORIENTED STUDIES			2,353,150	42.45
NONTAXA-ORIENTED STUDIES	3,190,486	57.55	3,190,486	57.55
TOTAL	5,543,636	100.00	5,543,636	100.00

TABLE 125B: Proportional distribution of declined proposals in ECOSYSTEM STUDIES in fiscal year 1980, involving higher taxa (based on a sample of 15 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Insects	3	20.00		
Algae	1	6.70		
Bacteria	1	6.70		
Insects/Hi. Vasc. Plants	1	6.70		
Bacteria/Protozoa/Plants	1	6.70		
TOTAL TAXA-ORIENTED STUDIES		46.80	7	46.80
NONTAXA-ORIENTED STUDIES	8	53.20	8	53.20
TOTAL	15	100.00	15	100.00

TABLE 126A: Proportional distribution of dollars requested in declined proposals in ECOSYSTEM STUDIES in fiscal year 1981, involving higher taxa (based on a sample of 15 declines).

HIGHER TAXA STUDIED	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Higher Vascular Plants	1,450,807	26.17		
Algae	86,670	1.56		
Bacteria	131,557	2.37		
Hi. Vascular Plants/Fungi	307,050	5.54		
Bacteria/Protozoa/Plants	377,066	6.80		
TOTAL TAXA-ORIENTED STUDIES			2,353,150	42.44
NONTAXA-ORIENTED STUDIES	3,190,486	57.55	3,190,486	57.55
TOTAL	5,543,636	100.00	5,543,636	100.00

TABLE 126B: Proportional distribution of declined proposals in ECOSYSTEM STUDIES in fiscal year 1981, involving higher taxa (based on a sample of 15 declines).

HIGHER TAXA STUDIED	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
TAXA-ORIENTED STUDIES				
Higher Vascular Plants	3	20.00		
Algae	1	6.70		
Bacteria	1	6.70		
Hi. Vascular Plants/Fungi	1	6.70		
Bacteria/Protozoa/Plants	1	6.70		
TOTAL TAXA-ORIENTED STUDIES		46.80	7	46.80
NONTAXA-ORIENTED STUDIES	8	53.20	8	53.20
TOTAL	15	100.00	15	100.00

TABLE 127A: Proportional distribution of dollars awarded in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to type of facility/ discipline (based on a sample of 60 awards).

FACILITY/DISCIPLINE	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	106,182	1.63				
Birds	273,495	4.20				
Amphibians/Reptiles	392,125	6.03				
Fish	483,610	7.43				
Vertebrates, General	52,100	0.80				
Total Vertebrate Collections			1,307,512	20.09		
Mollusks	38,229	0.59				
Insects	368,138	5.66				
Invertebrates, General	48,415	0.74				
Total Invertebrate Colns.			454,782	6.99		
Vertebrate Fossils	88,343	1.36				
Invertebrate Fossils	100,001	1.54				
Total Animal Fossil Colns.			188,344	2.90		
Botany, General	1,148,463	17.65				
Total Botany Collections			1,148,463	17.65		
TOTAL SYSTEMATICS COLLECTIONS					3,099,101	47.63
LIVING ORGANISM STOCK CENTERS						
Animal	410,338	6.31				
Plant	394,097	6.06				
Paramecia	63,070	0.97				
Bacteria	230,439	3.54				
TOTAL LIVING ORGANISM STOCK CENTERS			1,097,944	16.88	1,097,944	16.88
CONTROLLED ENVIRONMENT FACILITIES	310,457	4.77	310,457	4.77	310,457	4.77
FIELD STATIONS	746,880	11.48	746,880	11.48	746,880	11.48
MONOGRAPH PUBLICATIONS	53,322	0.82	53,322	0.82	53,322	0.82
LONG-TERM ECOLOGICAL RESEARCH	1,200,000	18.44	1,200,000	18.44	1,200,000	18.44
TOTAL	6,507,704	100.00	6,507,704	100.00	6,507,704	100.00

TABLE 127B: Proportional distribution of awards in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to type of facility/ discipline (based on a sample of 60 awards).

FACILITY/DISCIPLINE	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	3	5.00				
Birds	2	3.33				
Amphibians/Reptiles	3	5.00				
Fish	5	8.33				
Vertebrates, General	1	1.67				
Total Vertebrate Collections			14	23.33		
Mollusks	1	1.67				
Insects	6	10.00				
Invertebrates, General	1	1.67				
Total Invertebrate Colns.			8	13.34		
Vertebrate Fossils	2	3.33				
Invertebrate Fossils	1	1.67				
Total Animal Fossils Colns.			3	5.00		
Botany, General	9	15.00				
Total Botany Collections			9	15.00		
TOTAL SYSTEMATICS COLLECTIONS					34	56.67
LIVING ORGANISM STOCK CENTERS						
Animal	5	8.33				
Plant	4	6.67				
Paramecia	1	1.67				
Bacteria	3	5.00				
TOTAL LIVING ORGANISM STOCK CENTERS			13	21.67	13	21.67
CONTROLLED ENVIRONMENT FACILITIES	2	3.33	2	3.33	2	3.33
FIELD STATIONS	4	6.67	4	6.67	4	6.67
MONOGRAPH PUBLICATIONS	1	1.67	1	1.67	1	1.67
LONG-TERM ECOLOGICAL RESEARCH	6	10.00	6	10.00	6	10.00
TOTAL	60	100.00	60	100.00	60	100.00

TABLE 128A: Proportional distribution of dollars awarded in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to type of facility/discipline (based on a sample of 61 awards).

FACILITY/DISCIPLINE	DOLLARS AWARDED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	127,504	2.50				
Birds	182,205	3.50				
Amphibians/Reptiles	155,736	3.00				
Fish	176,001	3.40				
Total Vertebrate Collections			641,446	12.40		
Mollusks	40,893	0.80				
Insects	605,225	11.70				
Invertebrates, General	309,789	6.00				
Total Invertebrate Colns.			955,907	18.50		
General Zoology Collections	45,986	0.90	45,986	0.90		
Vertebrate Fossils	234,233	4.50				
Total Animal Fossils Colns.			234,233	4.50		
Botany, General	1,146,941	22.20				
Total Botany Collections			1,146,941	22.20		
TOTAL SYSTEMATICS COLLECTIONS					3,024,513	58.50
LIVING ORGANISM STOCK CENTERS						
Animal	460,744	8.90				
Plant	190,563	3.70				
Paramecia	68,740	1.30				
Bacteria	266,737	5.20				
TOTAL LIVING ORGANISM STOCK CENTERS			986,784	19.10	986,784	19.10
CONTROLLED ENVIRONMENT FACILITIES	170,000	3.30	170,000	3.30	170,000	3.30
FIELD STATIONS	902,401	17.50	902,401	17.50	902,401	17.50
WORKSHOPS/SURVEYS	25,000	0.50	25,000	0.50	25,000	0.50
MONOGRAPH PUBLICATIONS	60,646	1.20	60,646	1.20	60,646	1.20
TOTAL	5,169,344	100.00	5,169,344	100.00	5,169,344	100.00

TABLE 128B: Proportional distribution of awards in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to type of facility/discipline (based on a sample of 61 awards).

FACILITY/DISCIPLINE	NUMBER AWARDS	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	3	4.92				
Birds	4	6.56				
Amphibians/Reptiles	2	3.28				
Fish	4	6.56				
Total Vertebrate Collections			13	21.32		
Mollusks	1	1.64				
Insects	6	9.84				
Invertebrates, General	3	4.92				
Total Invertebrate Colns.			10	16.40		
General Zoology Collections	1	1.64	1	1.64		
Vertebrate Fossils	3	4.92				
Total Animal Fossil Colns.			3	4.92		
Botany, General	9	14.75				
Total Botany Collections			9	14.75		
TOTAL SYSTEMATICS COLLECTIONS					36	59.03
LIVING ORGANISM STOCK CENTERS						
Animal	6	9.84				
Plant	3	4.92				
Paramecia	1	1.64				
Bacteria	3	4.92				
TOTAL LIVING ORGANISM STOCK CENTERS			13	21.32	13	21.32
CONTROLLED ENVIRONMENT FACILITIES	1	1.64	1	1.64	1	1.64
FIELD STATIONS	7	11.48	7	11.48	7	11.48
WORKSHOPS/SURVEYS	1	1.64	1	1.64	1	1.64
MONOGRAPH PUBLICATIONS	3	4.92	3	4.92	3	4.92
TOTAL	61	100.00	61	100.00	61	100.00

TABLE 129A: Proportional distribution of dollars requested in declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to facility/discipline (based on a sample of 12 declines).

FACILITY/DISCIPLINE	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Invertebrates, General	194,763	6.56				
Total invertebrate Colns.			194,763	6.56		
Vertebrate Fossils	144,762	4.88				
Invertebrate Fossils	99,974	3.37				
Total Animal Fossil Colns.			244,736	8.25		
Botany, General	440,431	14.81				
Total Botany Collections			440,431	14.81		
TOTAL SYSTEMATICS COLLECTIONS					879,930	29.62
CONTROLLED ENVIRONMENT FACILITIES	95,000	3.20	95,000	3.20	95,000	3.20
FIELD STATIONS	379,750	12.80	379,750	12.80	379,750	12.80
WORKSHOPS/SURVEYS	40,000	1.30	40,000	1.30	40,000	1.30
MONOGRAPH PUBLICATIONS	15,000	0.50	15,000	0.50	15,000	0.50
UNASSIGNED	1,558,447	52.50	1,558,447	52.50	1,558,447	52.50
TOTAL	2,968,127	100.00	2,968,127	100.00	2,968,127	100.00

TABLE 129B: Proportional distribution of declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to facility/discipline (based on a sample of 12 declines).

FACILITY/DISCIPLINE	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Invertebrates, General	1	8.33				
Total Invertebrate Colns.			1	8.33		
Vertebrate Fossils	1	8.33				
Invertebrate Fossils	1	8.33				
Total Animal Fossil Colns.			2	16.66		
Botany, General	2	16.67				
Total Botany Collections			2	16.67		
TOTAL SYSTEMATICS COLLECTIONS					5	41.66
CONTROLLED ENVIRONMENT FACILITIES	1	8.33	1	8.33	1	8.33
FIELD STATIONS	3	25.00	3	25.00	3	25.00
WORKSHOPS/SURVEYS	1	8.33	1	8.33	1	8.33
MONOGRAPH PUBLICATIONS	1	8.33	1	8.33	1	8.33
UNASSIGNED	1	8.33	1	8.33	1	8.33
TOTAL	12	100.00	12	100.00	12	100.00

TABLE 130A: Proportional distribution of dollars requested in declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to facility/discipline (based on a sample of 19 declines).

FACILITY/DISCIPLINE	DOLLARS REQUESTED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	602,917	13.46				
Amphibians/Reptiles	181,808	4.06				
Vertebrates, General	296,194	6.61				
Total Vertebrate Collections			1,080,919	24.13		
Insects	135,750	3.03				
Total Invertebrate Colns.			135,750	3.03		
Animal Fossil Collections	2,048,151	45.73	2,048,151	45.73		
Botany, General Collections	163,696	3.65	163,696	3.65		
TOTAL SYSTEMATICS COLLECTIONS					3,428,516	76.54
LIVING ORGANISM STOCK CENTERS	746,372	16.66	746,372	16.66	746,372	16.66
CONTROLLED ENVIRONMENT FACILITIES	90,162	2.01	90,162	2.01	90,162	2.01
FIELD STATIONS	210,549	4.70	210,549	4.70	210,549	4.70
MONOGRAPH PUBLICATIONS	3,440	0.08	3,440	0.08	3,440	0.08
TOTAL	4,479,039	100.00	4,479,039	100.00	4,479,039	100.00

TABLE 130B: Proportional distribution of declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to facility/discipline (based on a sample of 19 declines).

FACILITY/DISCIPLINE	NUMBER DECLINED	PERCENT	SUB-TOTAL	PERCENT	TOTAL	PERCENT
SYSTEMATICS COLLECTIONS						
Mammals	1	5.26				
Amphibians/Reptiles	1	5.26				
Vertebrates, General	2	10.53				
Total Vertebrate Collections			4	21.05		
Insects	1	5.26				
Total invertebrate Colns.			1	5.26		
Animal Fossil Collections	3	15.79	3	15.79		
Botany, General Collections	3	15.79	3	15.79		
TOTAL SYSTEMATICS COLLECTIONS					11	57.89
LIVING ORGANISM STOCK CENTERS	3	15.79	3	15.79	3	15.79
CONTROLLED ENVIRONMENT FACILITIES	1	5.26	1	5.26	1	5.26
FIELD STATIONS	3	15.79	3	15.79	3	15.79
MONOGRAPH PUBLICATIONS	1	5.26	1	5.26	1	5.26
TOTAL	19	100.00	19	100.00	19	100.00

Funding According to Types of Studies

The "Types of Studies" supported by the five programs in the Division were also reviewed.

In the Systematic Biology program, 96% of the funds awarded were for research and 4% for equipment and community services (Tables 131 and 132). Within the subcategories of research, 85% and 86% of the funds were awarded for taxonomically oriented studies for fiscal years 1980 and 1981, respectively; 10% were awarded in each fiscal year for theoretically oriented studies that were not attributable to a particular taxonomic group. Within the taxonomically oriented studies, approximately 50% of the funds awarded in each year were for characterizations; 13% and 21% were for inventories, while 15% and 23% were for monographic/revisionary studies in fiscal years 1980 and 1981, respectively. A similar pattern is represented in the review of declined proposals in the Systematic Biology program (Tables 133 and 134).

All proposals managed in the Population Biology and Physiological Ecology program could be coded using the same "Type of Study" categories employed for the Systematic Biology program (Tables 135 and 136). Overall, a slightly higher percentage of the funds awarded were for theoretical studies, and no funds were awarded exclusively for equipment or community service projects. Declines are summarized in Tables 137 and 138.

Review of the Ecology program required expanding the number of categories used to code the "Type of Study." It is clear that the emphasis of researchers applying to the Ecology program is different from that expressed by applicants to the Systematic Biology or Population Biology and Physiological Ecology programs. In fiscal years 1980 and 1981, respectively, 44% and 52% of the funds awarded under the Ecology program were for projects focusing on generalized organismic interactions within a community; 45% and 40% were for studies of interactions between specifically identified organisms (Tables 139 and 140). In the same years, 4% and 6% of the funds were used to support theoretical studies in ecology; very small percentages, 2% and 1%, were attributed to taxonomic studies, while 2% and 1% of the funds awarded were used to support community service projects. Declined proposals by the Ecology program (based on funds requested in fiscal year 1980) are divided between specific organism interactions (48%) and general community interactions (52%) (Table 141).

Abiotic influences on both specific organism interactions and community interactions were most commonly studied. In fiscal year 1981 a much larger percentage of the funds requested in declined proposals was associated with studies of specific organism interactions (Table 142).

The Biological Research Resources program, because of its focus on facilities rather than research, was reviewed from the perspective of "Type of Support" rather than "Type of Study." Based on the two years covered in this study and discounting the funds awarded for Long-Term Ecological Research in fiscal year 1980, approximately half of the funds were awarded for General Operating Support, while the remainder provided support for special projects (Tables 143 and 144).

Within the category of "Special Project Support," there is modest variation in the distribution of funds according to project type from 1980 to 1981. Both "Relocation/Consolidation" and "Reconstruction/Renovation" projects, however, received a relatively high percentage of the funds awarded. Computerization projects received a very small percentage of the funds in both years. Declines are summarized in Tables 145 and 146.

Based on data provided by the Biological Research Resources (BRR) Program Director, a total of $6,600,000 was awarded by the BRR program in fiscal year 1982, of which 54.5% ($3,600,000) supported systematics collections, 19.4% ($1,300,000) funded living organism stock centers, and 14.6% ($970,000) supported floral and faunal surveys. In fiscal year 1982, most floral and faunal surveys with a primary emphasis on field collecting and specimen curating were administratively transferred from the Systematic Biology program to the Biological Research Resources program with the funds necessary to support awarded proposals.

The funding record for the BRR program for an 11-year period ending in fiscal year 1982 is given in Table 147. A total of $43,700,000 was awarded through this program during this period. The BRR program budget increased from $950,000 in 1972 to $6,600,000 in 1982, a six fold increase in the original budget. While BRR's increase of funds in 1982 was 14% over the previous year, systematics collections received a 13% increase in funds. Over $27,000,000

(62%) went to support systematics collections during the fiscal years 1972-1982. The distribution of these funds to 26 institutions is shown in Table 148 and to various disciplines in Table 149.

Proposals funded under the Ecosystem Studies program were not analyzed according to "Types of Studies" supported; most projects involved a number of activities comparable to a single proposal under the other programs. The data would not have been comparable.

TABLE 131A: Proportional distribution of dollars awarded in SYSTEMATIC BIOLOGY in fiscal year 1980, according to Type of Study (based on a sample of 235 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL PERCENT	TOTAL PERCENT
PHENOMENON ORIENTATION				
Classification/Phylogenetic Models	274,589	3.5		
Evolutionary Processes	499,446	6.4		
Biogeographic Relationships	26,271	0.3		
Behavioral Relationships	16,000	0.2		
Form/Structural Relationships	4,450	0.1		
TOTAL PHENOMENON ORIENTATION			820,756 10.5	820,756 10.5
TAXONOMIC ORIENTATION				
INVENTORIES	1,605,782	20.6	1,605,782 20.6	
CHARACTERIZATIONS				
Biochemical	661,158	8.5		
Morphology, Cytology, Embryology	1,770,004	22.7		
Behavior, Life Cycle, Home Range	161,131	2.1		
Biogeography, Stratigraphy, Demography	66,158	0.8		
Genetics	822,096	10.5		
Classification, Descriptive	254,153	3.3		
Ecological, Habitat Influence	12,003	0.2		
Other	127,553	1.6		
TOTAL CHARACTERIZATIONS			3,874,256 49.7	
MONOGRAPHIC/REVISIONARY	1,151,205	14.8	1,151,205 14.8	
TOTAL TAXONOMIC ORIENTATION				6,631,243 85.1
EQUIPMENT	194,374	2.5	194,374 2.5	194,374 2.5
COMMUNITY SERVICES	153,475	2.0	153,475 2.0	153,475 2.0
TOTAL	7,799,848	100.0	7,799,848 100.0	7,799,848 100.0

TABLE 131B: Proportional distribution of awards in SYSTEMATIC BIOLOGY in fiscal year 1980, according to Type of Study (based on a sample of 235 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Classification/Phylogenetic Models	7	3.0				
Evolutionary Processes	17	7.2				
Biogeographic Relationships	1	0.4				
Behavioral Relationships	1	0.4				
Form/Structural Relationships	1	0.4				
TOTAL PHENOMENON ORIENTATION			27	11.4	27	11.4
TAXONOMIC ORIENTATION						
INVENTORIES	41	17.4	41	17.4		
CHARACTERIZATIONS						
Biochemical	16	6.8				
Morphology, Cytology, Embryology	46	19.6				
Behavior, Life Cycle, Home Range	4	1.7				
Biogeography, Stratigraphy, Demography	2	0.9				
Genetics	18	7.7				
Classification, Descriptive	14	6.0				
Ecological, Habitat Influence	2	0.9				
Other	4	1.7				
TOTAL CHARACTERIZATIONS			106	45.3		
MONOGRAPHIC/REVISIONARY	42	17.9	42	17.9		
TOTAL TAXONOMIC ORIENTATION					189	80.6
EQUIPMENT	8	3.4	8	3.4	8	3.4
COMMUNITY SERVICES	11	4.7	11	4.7	11	4.7
TOTAL	235	100.0	235	100.0	235	100.0

TABLE 132A: Proportional distribution of dollars awarded in SYSTEMATIC BIOLOGY in fiscal year 1981, according to Type of Study (based on a sample of 242 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Classification/Phylogenetic Models	215,464	2.7				
Evolutionary Processes	515,955	6.4				
Biogeographic Relationships	27,322	0.3				
Form/Structural Relationships	83,232	1.0				
TOTAL PHENOMENON ORIENTATION			841,973	10.4	841,973	10.4
TAXONOMIC ORIENTATION						
INVENTORIES	1,076,169	13.3	1,076,169	13.3		
CHARACTERIZATIONS						
Biochemical	374,097	4.6				
Morphology, Cytology, Embryology	2,021,829	25.0				
Behavior, Life Cycle, Home Range	124,550	1.5				
Biogeography, Stratigraphy, Demography	60,634	0.7				
Genetics	685,551	8.5				
Classification, Descriptive	323,044	4.0				
Ecological, Habitat Influence	80,855	1.0				
Evolutionary Studies	306,344	3.8				
TOTAL CHARACTERIZATIONS			3,976,904	49.1		
MONOGRAPHIC/REVISIONARY	1,887,694	23.3	1,887,694	23.3		
TOTAL TAXONOMIC ORIENTATION					6,940,767	85.7
EQUIPMENT	149,221	1.8	149,221	1.8	149,221	1.8
COMMUNITY SERVICES	104,136	1.3	104,136	1.3	104,136	1.3
NONASSIGNED	61,000	0.8	61,000	0.8	61,000	0.8
TOTAL	8,097,097	100.0	8,097,097	100.0	8,097,097	100.0

TABLE 132B: Proportional distribution of awards in SYSTEMATIC BIOLOGY in fiscal year 1981, according to Type of Study (based on a sample of 242 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Classification/Phylogenetic Models	6	2.5				
Evolutionary Processes	16	6.6				
Biogeographic Relationships	1	0.4				
Form/Structural Relationships	2	0.8				
TOTAL PHENOMENON ORIENTATION			25	10.3	25	10.3
TAXONOMIC ORIENTATION						
INVENTORIES	31	12.8	31	12.8		
CHARACTERIZATIONS						
Biochemical	11	4.5				
Morphology, Cytology, Embryology	57	23.6				
Behavior, Life Cycle, Home Range	5	2.1				
Biogeography, Stratigraphy, Demography	1	0.4				
Genetics	14	5.8				
Classification, Descriptive	8	3.3				
Ecological, Habitat Influence	3	1.2				
Evolutionary Studies	9	3.7				
TOTAL CHARACTERIZATIONS			108	44.6		
MONOGRAPHIC/REVISIONARY	61	25.2	61	25.2		
TOTAL TAXONOMIC ORIENTATION					200	82.6
EQUIPMENT	4	1.7	4	1.7	4	1.7
COMMUNITY SERVICES	8	3.3	8	3.3	8	3.3
NONASSIGNED	5	2.1	5	2.1	5	2.1
TOTAL	242	100.0	242	100.0	242	100.0

TABLE 133A: Proportional distribution of dollars requested in declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1980, according to Type of Study (based on a sample of 114 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Classification/Phylogenetic Models	799,740	8.5				
Evolutionary Processes	806,283	8.6				
Biogeographic Relationships	170,807	1.8				
Form/Structural Relationships	114,996	1.2				
General	38,339	0.4				
TOTAL PHENOMENON ORIENTATION			1,930,165	20.5	1,930,165	20.5
TAXONOMIC ORIENTATION						
INVENTORIES	1,055,874	11.2	1,055,874	11.2		
CHARACTERIZATIONS						
Biochemical	1,163,770	12.4				
Morphology, Cytology, Embryology	2,022,335	21.5				
Behavior, Life Cycle, Home Range	94,230	1.0				
Biogeography, Stratigraphy, Demography	60,786	0.6				
Genetics	264,994	2.8				
Classification, Descriptive	454,772	4.8				
Ecological, Habitat Influence	116,180	1.2				
Other	242,952	2.6				
TOTAL CHARACTERIZATIONS			4,420,019	46.9		
MONOGRAPHIC/REVISIONARY	1,257,566	13.4	1,257,566	13.4		
TOTAL TAXONOMIC ORIENTATION					6,733,459	71.5
EQUIPMENT	7,010	0.1	7,010	0.1	7,010	0.1
COMMUNITY SERVICES	742,475	7.9	742,475	7.9	742,475	7.9
TOTAL	9,413,109	100.0	9,413,109	100.0	9,413,109	100.0

TABLE 133B: Proportional distribution of declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1980, according to Type of Study (based on a sample of 114 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Classification/Phylogenetic Models	6	5.3				
Evolutionary Processes	4	3.5				
Biogeographic Relationships	2	1.8				
Form/Structural Relationships	2	1.8				
General	1	0.9				
TOTAL PHENOMENON ORIENTATION			15	13.3	15	13.3
TAXONOMIC ORIENTATION						
INVENTORIES	15	13.2	15	13.2		
CHARACTERIZATIONS						
Biochemical	11	9.6				
Morphology, Cytology, Embryology	27	23.7				
Behavior, Life Cycle, Home Range	3	2.6				
Biogeography, Stratigraphy, Demography	3	2.6				
Genetics	2	1.8				
Classification, Descriptive	10	8.8				
Ecological, Habitat Influence	1	0.9				
Other	5	4.4				
TOTAL CHARACTERIZATIONS			62	54.4		
MONOGRAPHIC/REVISIONARY	18	15.8	18	15.8		
TOTAL TAXONOMIC ORIENTATION					95	83.4
EQUIPMENT	1	0.9	1	0.9	1	0.9
COMMUNITY SERVICES	3	2.6	3	2.6	3	2.6
TOTAL	114	100.0	114	100.0	114	100.0

TABLE 134A: Proportional distribution of dollars requested in declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1981, according to Type of Study (based on a sample of 141 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Evolutionary Processes	1,752,915	11.7				
Biogeographic Relationships	42,831	0.3				
Form/Structural Relationships	622,375	4.1				
TOTAL PHENOMENON ORIENTATION			2,418,121	16.1	2,418,121	16.1
TAXONOMIC ORIENTATION						
INVENTORIES	2,267,934	15.1	2,267,934	15.1		
CHARACTERIZATIONS						
Biochemical	1,907,397	12.7				
Morphology, Cytology, Embryology	1,782,510	11.9				
Behavior, Life Cycle, Home Range	692,533	4.6				
Biogeography, Stratigraphy, Demography	157,058	1.0				
Genetics	1,368,299	9.1				
Classification, Descriptive	1,531,538	10.2				
Ecological, Habitat Influence	526,479	3.5				
Evolutionary Studies	715,460	4.8				
TOTAL CHARACTERIZATIONS			8,681,274	57.8		
MONOGRAPHIC/REVISIONARY	1,458,696	9.7	1,458,696	9.7		
TOTAL TAXONOMIC ORIENTATION					12,407,904	82.6
EQUIPMENT	82,966	0.6	82,966	0.6	82,966	0.6
COMMUNITY SERVICES	95,812	0.6	95,812	0.6	95,812	0.6
TOTAL	15,004,803	100.0	15,004,803	100.0	15,004,803	100.0

TABLE 134B: Proportional distribution of declined proposals in SYSTEMATIC BIOLOGY in fiscal year 1981, according to Type of Study (based on a sample of 141 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION						
Evolutionary Processes	12	8.5				
Biogeographic Relationships	1	0.7				
Form/Structural Relationships	4	2.8				
TOTAL PHENOMENON ORIENTATION			17	12.0	17	12.0
TAXONOMIC ORIENTATION						
INVENTORIES	21	14.9	21	14.9		
CHARACTERIZATIONS						
Biochemical	15	10.6				
Morphology, Cytology, Embryology	19	13.5				
Behavior, Life Cycle, Home Range	7	5.0				
Biogeography, Stratigraphy, Demography	4	2.8				
Genetics	11	7.8				
Classification, Descriptive	16	11.3				
Ecological, Habitat Influence	4	2.8				
Evolutionary Studies	7	5.0				
TOTAL CHARACTERIZATIONS			83	58.8		
MONOGRAPHIC/REVISIONARY	17	12.1	17	12.1		
TOTAL TAXONOMIC ORIENTATION					121	85.8
EQUIPMENT	2	1.4	2	1.4	2	1.4
COMMUNITY SERVICES	1	0.7	1	0.7	1	0.7
TOTAL	141	100.0	141	100.0	141	100.0

TABLE 135A: Proportional distribution of dollars awarded in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 30 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	141,206	12.11	141,206	12.11
TAXONOMIC ORIENTATION INVENTORIES	13,644	1.17	13,644	1.17
CHARACTERIZATIONS				
Biochemical	85,000	7.29		
Morphology, Cytology, Embryology	23,519	2.02		
Behavior, Life Cycle, Home Range	87,449	7.50		
Genetics	276,477	23.70		
Ecological, Habitat Influence	423,008	36.26		
Other	40,000	3.43		
TOTAL CHARACTERIZATIONS			935,453	80.20
MONOGRAPHIC/REVISIONARY	76,191	6.52	76,191	6.52
TOTAL	1,166,494	100.00	1,166,494	100.00

TABLE 135B: Proportional distribution of awards in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 30 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	5	16.67	5	16.67
TAXONOMIC ORIENTATION INVENTORIES	1	3.33	1	3.33
CHARACTERIZATIONS				
Biochemical	1	3.33		
Morphology, Cytology, Embryology	1	3.33		
Behavior, Life Cycle, Home Range	5	16.67		
Genetics	6	20.00		
Ecological, Habitat Influence	9	30.00		
Other	1	3.33		
TOTAL CHARACTERIZATIONS			23	76.67
MONOGRAPHIC/REVISIONARY	1	3.33	1	3.33
TOTAL	30	100.00	30	100.00

TABLE 136A: Proportional distribution of dollars awarded in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 40 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	239,154	15.16	239,154	15.16
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Biochemical	123,500	7.83		
Morphology, Cytology, Embryology	23,653	1.50		
Behavior, Life Cycle, Home Range	112,268	7.12		
Genetics	458,912	29.09		
Ecological, Habitat Influence	477,188	30.25		
Other	81,486	5.17		
TOTAL CHARACTERIZATIONS	1,277,007		1,277,007	80.96
MONOGRAPHIC/REVISIONARY	61,164	3.88	61,164	3.88
TOTAL	1,577,325	100.00	1,577,325	100.00

TABLE 136B: Proportional distribution of awards in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to Type of Study on a random sample of 40 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	5	12.50	5	12.50
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Biochemical	2	5.00		
Morphology, Cytology, Embryology	1	2.50		
Behavior, Life Cycle, Home Range	5	12.50		
Genetics	11	27.50		
Ecological, Habitat Influence	12	30.00		
Other	3	7.50		
TOTAL CHARACTERIZATIONS			34	85.00
MONOGRAPHIC/REVISIONARY	1	2.50	1	2.50
TOTAL	40	100.00	40	100.00

TABLE 137A: Proportional distribution of dollars requested in declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 26 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	490,160	17.02	490,160	17.02
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Biochemical	118,718	4.12		
Morphology, Cytology, Embryology	142,387	4.94		
Behavior, Life Cycle, Home Range	1,140,969	39.61		
Genetics	237,486	8.24		
Ecological, Habitat Influence	178,502	6.20		
Other	572,215	19.86		
TOTAL CHARACTERIZATIONS			2,390,277	82.97
TOTAL	2,880,437	100.00	2,880,437	100.00

TABLE 137B: Proportional distribution of declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 26 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	4	15.38	4	15.38
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Biochemical	2	7.69		
Morphology, Cytology, Embryology	1	3.85		
Behavior, Life Cycle, Home Range	12	46.15		
Genetics	2	7.69		
Ecological, Habitat Influence	2	7.69		
Other	3	11.54		
TOTAL CHARACTERIZATIONS			22	84.61
TOTAL	26	100.00	26	100.00

TABLE 138A: Proportional distribution of dollars requested in declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 30 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	247,466	8.36	247,466	8.36
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Morphology, Cytology, Embryology	68,589	2.32		
Behavior, Life Cycle, Home Range	483,970	16.34		
Biogeography	87,991	2.97		
Genetics	450,237	15.20		
Ecological, Habitat Influence	958,382	32.36		
Other	522,237	17.64		
TOTAL CHARACTERIZATIONS			2,571,406	86.83
EQUIPMENT	142,300	4.81	142,300	4.81
TOTAL	2,961,172	100.00	2,961,172	100.00

TABLE 138B: Proportional distribution of declined proposals in POPULATION BIOLOGY AND PHYSIOLOGICAL ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 30 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
PHENOMENON ORIENTATION	3	10.00	3	10.00
TAXONOMIC ORIENTATION CHARACTERIZATIONS				
Morphology, Cytology, Embryology	1	3.33		
Behavior, Life Cycle, Home Range	7	23.33		
Biogeography	1	3.33		
Genetics	3	10.00		
Ecological, Habitat Influence	8	26.67		
Other	5	16.67		
TOTAL CHARACTERIZATIONS			25	83.33
EQUIPMENT	2	6.67	2	6.67
TOTAL	30	100.00	30	100.00

TABLE 139A: Proportional distribution of dollars awarded in ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 34 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
TAXONOMIC ORIENTATION	26,081	1.77	26,081	1.77
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING				
Predator-Prey models	59,860	4.07	59,860	4.07
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	36,194	2.46		
Biotic influences	120,607	8.21		
Life cycle energetics	379,756	25.84		
Symbiotic relationships	61,978	4.22		
Resource partitioning	58,995	4.01		
TOTAL SPECIFIC ORGANISM INTERACTIONS			657,530	44.74
COMMUNITY INTERACTIONS				
Abiotic influences	196,885	13.40		
Biotic influences	54,207	3.69		
Successional interactions	109,997	7.48		
Pollination	126,329	8.60		
Species diversity	40,501	2.76		
Trophic interactions	116,935	7.96		
TOTAL COMMUNITY INTERACTIONS			644,854	43.89
EQUIPMENT/FACILITIES	44,450	3.02	44,450	3.02
COMMUNITY SERVICES	36,946	2.51	36,946	2.51
TOTAL	1,469,721	100.00	1,469,721	100.00

TABLE 139B: Proportional distribution of awards in ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 34 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
TAXONOMIC ORIENTATION	2	5.88	2	5.88
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING				
Predator-Prey models	1	2.94	1	2.94
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	2	5.88		
Biotic influences	1	2.94		
Life cycle energetics	10	29.41		
Symbiotic relationships	2	5.88		
Resource partitioning	1	2.94		
TOTAL SPECIFIC ORGANISM INTERACTIONS			16	47.05
COMMUNITY INTERACTIONS				
Abiotic influences	4	11.76		
Biotic influences	1	2.94		
Successional interactions	3	8.82		
Pollination	2	5.88		
Species diversity	1	2.94		
Trophic interactions	1	2.94		
TOTAL COMMUNITY INTERACTIONS			12	35.28
EQUIPMENT/FACILITIES	2	5.88	2	5.88
COMMUNITY SERVICES	1	2.94	1	2.94
TOTAL	34	100.00	34	100.00

TABLE 140A: Proportional distribution of dollars awarded in ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 32 awards).

TYPE OF STUDY	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
TAXONOMIC ORIENTATION	10,000	0.81	10,000	0.81
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING				
Predator-Prey models	70,037	5.68	70,037	5.68
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	30,000	2.43		
Biotic influences	4,520	0.37		
Life cycle energetics	295,997	24.02		
Symbiotic relationships	26,170	2.12		
Pollination	75,000	6.09		
Resource partitioning	60,911	4.94		
TOTAL SPECIFIC ORGANISM INTERACTIONS			492,598	39.97
COMMUNITY INTERACTIONS				
Abiotic influences	229,073	18.59		
Biotic influences	80,246	6.51		
Successional interactions	129,266	10.49		
Species diversity	49,233	4.00		
Community structure	26,024	2.11		
Trophic interactions	127,315	10.33		
TOTAL COMMUNITY INTERACTIONS			641,157	52.03
COMMUNITY SERVICES	18,279	1.48	18,279	1.48
TOTAL	1,232,071	100.00	1,232,071	100.00

TABLE 140B: Proportional distribution of awards in ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 32 awards).

TYPE OF STUDY	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
TAXONOMIC ORIENTATION	1	3.13	1	3.13
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING				
Predator-Prey models	1	3.13	1	3.13
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	1	3.13		
Biotic influences	1	3.13		
Life cycle energetics	9	28.13		
Symbiotic relationships	1	3.13		
Pollination	1	3.13		
Resource partitioning	1	3.13		
TOTAL SPECIFIC ORGANISM INTERACTIONS			14	43.78
COMMUNITY INTERACTIONS				
Abiotic influences	5	15.63		
Biotic influences	2	6.25		
Successional interactions	3	9.38		
Species diversity	3	9.38		
Community structure	1	3.13		
Trophic interactions	1	3.13		
TOTAL COMMUNITY INTERACTIONS			15	46.90
COMMUNITY SERVICES	1	3.13	1	3.13
TOTAL	32	100.00	32	100.00

TABLE 141A: Proportional distribution of dollars requested in declined proposals in ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 14 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
ECOLOGICAL ORIENTATION				
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	200,448	9.14		
Biotic influences	23,701	1.08		
Life cycle energetics	533,319	24.32		
Competition	218,983	9.99		
Pollination	77,197	3.52		
TOTAL SPECIFIC ORGANISM INTERACTIONS			1,053,648	48.05
COMMUNITY INTERACTIONS				
Abiotic influences	1,080,626	49.27		
Biotic influences	58,789	2.68		
TOTAL COMMUNITY INTERACTIONS			1,139,415	51.95
TOTAL	2,193,063	100.00	2,193,063	100.00

TABLE 141B: Proportional distribution of declined proposals in ECOLOGY in fiscal year 1980, according to Type of Study (based on a random sample of 14 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
ECOLOGICAL ORIENTATION				
SPECIFIC ORGANISM INTERACTIONS				
Abiotic influences	2	14.30		
Biotic influences	1	7.14		
Life cycle energetics	3	21.43		
Competition	1	7.14		
Pollination	1	7.14		
TOTAL SPECIFIC ORGANISM INTERACTIONS			8	57.15
COMMUNITY INTERACTIONS				
Abiotic influences	5	35.71		
Biotic influences	1	7.14		
TOTAL COMMUNITY INTERACTIONS			6	42.85
TOTAL	14	100.00	14	100.00

TABLE 142A: Proportional distribution of dollars requested in declined proposals in ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 25 declines).

TYPE OF STUDY	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING	109,089	5.12	109,089	5.12
SPECIFIC ORGANISM INTERACTIONS				
General	39,287	1.85		
Life cycle energetics	1,190,416	55.92		
Pollination	345,804	16.24		
Resource partitioning	5,000	0.23		
TOTAL SPECIFIC ORGANISM INTERACTIONS			1,580,507	74.24
COMMUNITY INTERACTIONS				
Abiotic influences	64,828	3.05		
Successional interactions	86,644	4.07		
Structure/Resource Partitioning	197,603	9.28		
TOTAL COMMUNITY INTERACTIONS			349,075	16.40
EQUIPMENT	90,241	4.24	90,241	4.24
TOTAL	2,128,912	100.00	2,128,912	100.00

TABLE 142B: Proportional distribution of declined proposals in ECOLOGY in fiscal year 1981, according to Type of Study (based on a random sample of 25 declines).

TYPE OF STUDY	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
ECOLOGICAL ORIENTATION				
THEORETICAL/MODELING	2	8.00	2	8.00
SPECIFIC ORGANISM INTERACTIONS				
General	2	8.00		
Life cycle energetics	10	40.00		
Pollination	2	8.00		
Resource partitioning	1	4.00		
TOTAL SPECIFIC ORGANISM INTERACTIONS			15	60.00
COMMUNITY INTERACTIONS				
Abiotic influences	2	8.00		
Successional interactions	2	8.00		
Structure/Resource Partitioning	2	8.00		
TOTAL COMMUNITY INTERACTIONS			6	24.00
EQUIPMENT	2	8.00	2	8.00
TOTAL	25	100.00	25	100.00

TABLE 143A: Proportional distribution of dollars awarded in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to Type of Support (based on a sample of 60 awards).

TYPE OF SUPPORT	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	672,374	10.3		
Personnel	1,319,864	20.3		
Other	35,000	0.6		
TOTAL GENERAL OPERATING SUPPORT			2,027,238	31.2
SPECIALIZED SUPPORT				
Relocation/Consolidation	1,020,629	15.7		
Computerization	124,914	1.9		
Compactors, Storage Equipment	760,207	11.7		
Emergency, Special Assistance	53,322	0.8		
Reconstruction/Renovation	793,352	12.2		
Updating/Revising Data	475,942	7.3		
Establish Resource Facility	52,100	0.8		
Long-Term Ecological Research	1,200,000	18.4		
TOTAL SPECIALIZED SUPPORT			4,480,466	68.8
TOTAL	6,507,704	100.0	6,507,704	100.0

TABLE 143B: Proportional distribution of awards in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to Type of Support (based on sample of 60 awards).

TYPE OF SUPPORT	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	5	8.33		
Personnel	17	28.33		
Other	1	1.67		
TOTAL GENERAL OERATING SUPPORT			23	38.33
SPECIALIZED SUPPORT				
Relocation/Consolidation	8	13.33		
Computerization	3	5.00		
Compactors, Storage Equipment	6	10.00		
Emergency, Special Assistance	1	1.67		
Reconstruction/Renovation	5	8.33		
Updating/Revising Data	7	11.67		
Establish Resource Facility	1	1.67		
Long-Term Ecological Research	6	10.00		
TOTAL SPECIALIZED SUPPORT	37		37	61.67
TOTAL	60	100.00	60	100.00

TABLE 144A: Proportional distribution of dollars awarded in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to Type of Support (based on a sample of 61 awards).

TYPE OF SUPPORT	DOLLARS AWARDED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	431,904	8.4		
Personnel	1,857,828	35.9		
Other	312,094	6.0		
TOTAL GENERAL OPERATING SUPPORT			2,601,826	50.3
SPECIALIZED SUPPORT				
Relocation/Consolidation	603,746	11.7		
Computerization	108,952	2.1		
Compactors, Storage Equipment	235,570	4.6		
Reconstruction/Renovation	870,737	16.8		
Updating/Revising Data	728,518	14.1		
Establish Resource Facility	19,995	0.4		
TOTAL SPECIALIZED SUPPORT			2,567,518	49.7
TOTAL	5,169,344	100.0	5,169,344	100.0

TABLE 144B: Proportional distribution of awards in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to Type of Support (based on sample of 61 awards).

TYPE OF SUPPORT	NUMBER AWARDS	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	5	8.20		
Personnel	23	37.70		
Other	4	6.55		
TOTAL GENERAL OPERATING SUPPORT			32	52.45
SPECIALIZED SUPPORT				
Relocation/Consolidation	6	9.84		
Computerization	2	3.28		
Compactors, Storage Equipment	5	8.20		
Reconstruction/Renovation	5	8.20		
Updating/Revising Data	10	16.39		
Establish Resource Facility	1	1.64		
TOTAL SPECIALIZED SUPPORT			29	47.55
TOTAL	61	100.00	61	100.00

TABLE 145A: Proportional distribution of dollars requested in declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to Type of Support (based on a sample of 12 declines).

TYPE OF SUPPORT	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	15,000	0.5		
Personnel	148,250	5.0		
TOTAL GENERAL OPERATING SUPPORT			163,250	5.5
SPECIALIZED SUPPORT				
Relocation/Consolidation	360,481	12.1		
Computerization	99,974	3.4		
Compactors, Storage Equipment	274,713	9.3		
Reconstruction/Renovation	270,262	9.1		
Establish Resource Facility	1,558,447	52.5		
Special Equipment	241,000	8.1		
TOTAL SPECIALIZED SUPPORT			2,804,877	94.5
TOTAL	2,968,127	100.0	2,968,127	100.0

TABLE 145B: Proportional distribution of declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1980, according to Type of Support (based on a sample of 12 declines).

TYPE OF SUPPORT	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
General	1	8.33		
Personnel	2	16.67		
TOTAL GENERAL OPERATING SUPPORT			3	25.00
SPECIALIZED SUPPORT				
Relocation/Consolidation	1	8.33		
Computerization	1	8.33		
Compactors, Storage Equipment	2	16.67		
Reconstruction/Renovation	3	25.00		
Establish Resource Facility	1	8.33		
Special Equipment	1	8.33		
TOTAL SPECIALIZED SUPPORT			9	75.00
TOTAL	12	100.00	12	100.00

TABLE 146A: Proportional distribution of dollars requested in declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to Type of Support (based on a sample of 18 declines).

TYPE OF SUPPORT	DOLLARS REQUESTED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
Personnel	1,301,008	30.1		
Other	556,815	12.9		
TOTAL GENERAL OPERATING SUPPORT			1,857,823	43.0
SPECIALIZED SUPPORT				
Relocation/Consolidation	50,384	1.2		
Computerization	377,748	8.6		
Compactors, Storage Equipment	782,200	18.1		
Reconstruction/Renovation	787,679	18.2		
Updating/Revising Data	49,821	1.2		
Establish Resource Facility	246,373	5.6		
Special Equipment	175,469	4.1		
TOTAL SPECIALIZED SUPPORT			2,469,674	57.0
TOTAL	4,327,497	100.0	4,327,497	100.0

TABLE 146B: Proportional distribution of declined proposals in BIOLOGICAL RESEARCH RESOURCES in fiscal year 1981, according to Type of Support (based on a sample of 18 declines).

TYPE OF SUPPORT	NUMBER DECLINED	PERCENT	TOTAL	PERCENT
GENERAL OPERATING SUPPORT				
Personnel	1	5.56		
Other	2	11.11		
TOTAL GENERAL OPERATING SUPPORT			3	16.67
SPECIALIZED SUPPORT				
Relocation/Consolidation	1	5.56		
Computerization	4	22.22		
Compactors, Storage Equipment	3	16.66		
Reconstruction/Renovation	3	16.66		
Updating/Revising Data	1	5.56		
Establish Resource Facility	1	5.56		
Special Equipment	2	11.11		
TOTAL SPECIALIZED SUPPORT			15	83.33
TOTAL	18	100.00	18	100.00

TABLE 147: Summary of awards from the BIOLOGICAL RESEARCH RESOURCES program, for fiscal years 1972-1982, according to type of facility*.

TYPE OF FACILITY	DOLLARS AWARDED **	PERCENT
Systematic Collections	$ 27,089.7	62.0
Living Organism Stock Centers	7,964.2	18.2
Field Station Facilities	4,618.8	10.6
Controlled Environment Facilities	1,968.6	4.5
Workshops - Reports	705.1	1.6
Monograph Publications	145.2	0.3
Floral and Faunal Surveys	988.4	2.3
Multiuser Equipment	34.8	0.1
Marine Laboratories	150.0	0.4
TOTAL	$ 43,664.8	100.0

TABLE 148: BIOLOGICAL RESEARCH RESOURCES program support for systematics collections according to institution, fiscal years 1972-1982 (in thousands of dollars).*

INSTITUTION	TOTAL DOLLARS	PERCENT
Harvard University	4,438.5	16.38
American Museum of Natural History	3,228.5	11.92
Field Museum of Natural History	2,596.4	9.58
California Academy of Sciences	2,420.8	8.94
Academy of Natural Sciences of Philadelphia	2,100.4	7.75
University of Michigan	1,921.6	7.09
Missouri Botanical Garden	1,701.2	6.28
New York Botanical Garden	1,700.3	6.28
University of California, Berkeley	1,399.6	5.17
Bernice P. Bishop Museum	1,339.2	4.94
Los Angeles County Museum	1,128.7	4.17
Carnegie Museum	1,020.1	3.77
University of Kansas	405.4	1.50
Florida State Museum	380.4	1.40
Cornell University	309.8	1.14
University of Washington	206.3	0.76
Yale University	189.2	0.70
New York State Museum, Albany	160.1	0.59
Louisiana State University	125.5	0.46
Pomona College	112.5	0.42
Florida Department of Agriculture	70.7	0.26
University of Wyoming	53.3	0.20
California State Polytechnic	23.8	0.09
University of Georgia	21.6	0.08
Marie Selby Botanical Gardens	19.4	0.07
Fairchild Tropical Garden	16.4	0.06
TOTAL	$27,089.7	100.00

* Prepared by J. Tyler from BRR Program Records as of 9/30/82.

** In thousands; excludes $1.2 million in fiscal year 1980 of escrow funds for Long-Term Ecological Research temporarily placed in the BRR program for administrative purposes at the time.

TABLE 149: BIOLOGICAL RESEARCH RESOURCES program support for systematics collections according to discipline and institution, fiscal years 1972-1982 (in thousands of dollars).*

DISCIPLINE	INSTITUTION	TOTAL AWARDED	SUBTOTAL	PERCENT
BOTANY	Academy of Natural Sciences of Philadelphia	523.6		
	Bernice P. Bishop Museum	293.4		
	California Academy of Sciences	820.1		
	Carnegie Museum	120.0		
	Fairchild Tropical Garden	16.4		
	Field Museum of Natural History	452.8		
	Harvard University (Arnold Arboretum)	100.0		
	Harvard University (Gray Herbarium)	2,664.3		
	Marie Selby Botanical Gardens	19.4		
	Missouri Botanical Garden	1,701.2		
	New York Botanical Garden	1,700.3		
	Pomona College	112.5		
	University of Michigan	957.4		
	University of Washington	176.5		
	Subtotal		9,657.9	35.7
MALACOLOGY	Academy of Natural Sciences of Philadelphia	346.8		
	California Academy of Sciences	207.2		
	University of Michigan	180.7		
	Subtotal		734.7	2.7
MARINE INVERTE-BRATES	Bernice P. Bishop Museum	176.4		
	Harvard University	81.2		
	Subtotal		257.6	1.0
ENTOMOLOGY	Academy of Natural Sciences of Philadelphia	346.9		
	American Museum of Natural History	846.4		
	Bernice P. Bishop Museum	666.9		
	California Academy of Sciences	673.5		
	Carnegie Museum	300.0		
	Field Museum of Natural History	682.5		
	Florida Department of Agriculture	70.7		
	Harvard University	535.5		
	Los Angeles County Museum	63.7		
	University of Georgia	21.6		
	Subtotal		4,207.7	15.5
ICHTHYOLOGY	Academy of Natural Sciences of Philadelphia	637.0		
	Bernice P. Bishop Museum	202.5		
	California Academy of Sciences	478.6		
	California State Polytechnic	23.8		
	Cornell University	42.3		
	Field Museum of Natural History	370.9		
	Florida State Museum	203.5		
	Harvard University (MCZ)	473.7		
	Los Angeles County Museum	280.7		
	University of Michigan	194.8		
	University of Washington	29.8		
	Subtotal		2,937.6	10.8

TABLE 149 Continued: BIOLOGICAL RESEARCH RESOURCES program support for systematics collections according to discipline and institution, fiscal years 1972-1982 (in thousands of dollars).*

DISCIPLINE	INSTITUTION	TOTAL AWARDED	SUBTOTAL	PERCENT
HERPETOLOGY	American Museum of Natural History	394.9		
	California Academy of Sciences	241.4		
	Field Museum of Natural History	141.4		
	Harvard University (MCZ)	311.3		
	Los Angeles County Museum	309.7		
	University of Kansas	100.8		
	University of Michigan	255.0		
	Subtotal		1,754.5	6.5
ORNITHOLOGY	Academy of Natural Sciences of Philadelphia	246.1		
	American Museum of Natural History	432.5		
	Carnegie Museum	83.8		
	Cornell University	267.5		
	Field Museum of Natural History	88.8		
	Louisiana State University	109.1		
	University of California, Berkeley	452.4		
	University of Kansas	93.0		
	University of Michigan	121.7		
	Subtotal		1,894.9	7.0
MAMMALOGY	American Museum of Natural History	395.1		
	Carnegie Museum	213.2		
	Field Museum of Natural History	548.2		
	Louisiana State University	16.4		
	University of California, Berkeley	502.2		
	University of California, Berkeley (Tissue)	140.4		
	University of Michigan	212.0		
	Subtotal		2,027.5	7.5
FOSSIL INVERTE-BRATES	American Museum of Natural History	346.2		
	New York State Museum, Albany	160.1		
	Los Angeles County Museum	22.2		
	Subtotal		528.5	2.0
FOSSIL VERTEBRATES	American Museum of Natural History	813.4		
	Carnegie Museum	303.1		
	Field Museum of Natural History	311.8		
	Florida State Museum	176.9		
	Harvard University (MCZ)	272.5		
	Los Angeles County Museum	452.4		
	University of California, Berkeley	304.6		
	University of Kansas	211.6		
	University of Wyoming	53.3		
	Yale University	189.2		
	Subtotal		3,088.8	
GRAND TOTAL			27,089.7	100.0

*Prepared by J. Tyler from BRR Program Records as of 9/30/82.

Demography of Grant Applicants in the NSF

The year in which grant recipients were born or received their highest degrees follows a similar pattern across the five programs (Tables 150 and 152). Those declined funding, however, tend to be younger and received their highest degrees more recently (Tables 151 and 153). In comparing the year applicants received their highest degrees across programs, the mean year ranged from 1961 (in Systematic Biology) to 1970 (in Population Biology and Physiological Ecology). In the general population (Table 51), the modal frequency class in which the highest degree was received is 1970-1974.

The distribution of gender of grant applicants in Systematic Biology (awards and declines) strongly correlates with the distribution found in the general population of systematic biologists (Tables 154, 155, and 8).

The types of institutions at which grant applicants work (Tables 156 and 157) also strongly correlate with the distribution represented in the general population (Table 64) when the latter is adjusted by removing those individuals that work in government agencies and private industry. The percentage of research grants awarded (i.e., excluding the Biological Research Resources program) to freestanding museums is greatest from Systematic Biology (15%). Interestingly, of the respondents to the demographic survey, 15% indicated they were employed in museums.

TABLE 150: Birth years of grant recipients in the Division of Biotic Systems and Resources in fiscal years 1980 and 1981, according to program (mean and standard deviation rounded to nearest year).

PROGRAM	1980 N	1980 MEAN	1980 STAND. DEV.	1980 MODE/N	1980 RANGE	1981 N	1981 MEAN	1981 STAND. DEV.	1981 MODE/N	1981 RANGE
Syst. Biology	226	1933	12	1943/16	1889-1952	225	1935	10	1942/16	1903-1953
Biol. Res. Resources	57	1933	9	1930/6	1911-1947	61	1934	8	1930/9	1915-1951
Pop. Biol. & Phys. Ecol.	27	1941	9	1942/5	1914-1951	37	1941	9	1943/4 1944/4	1913-1951
Ecology	32	1940	9	1937/3 1939/3 1947/3	1914-1953	34	1941	8	1929/3 1939/3 1942/3 1947/3	1925-1953
Ecosystems Studies	20	1936	8	1925/3 1938/3 1941/3	1919-1949	19	1937	7	1938/3 1941/3	1919-1949

TABLE 151: Birth years of grant applicants (declined) in the Division of Biotic Systems and Resources, in fiscal years 1980 and 1981, according to program (mean and standard deviation rounded to nearest year).

PROGRAM	1980 N	1980 MEAN	1980 STAND. DEV.	1980 MODE/N	1980 RANGE	1981 N	1981 MEAN	1981 STAND. DEV.	1981 MODE/N	1981 RANGE
Syst. Biology	110	1936	10	1942/7 1947/7	1902-1953	133	1937	10	1934/8	1907-1954
Biological Research Resources	10	1929	9	1921/2	1915-1942	16	1932	10	1920/2 1930/2 1936/2 1941/2	1915-1943
Pop. Biol. & Phys. Ecol.	25	1942	7	1945/5	1926-1953	21	1941	10	1944/4 1951/4	1916-1951
Ecology	12	1944	4	1942/3 1946/3	1933-1949	21	1939	10	1942/3	1918-1953
Ecosystems Studies	13	1939	7	1936/2	1928-1949	13	1939	9	1945/2 1943/2 1947/2	1922-1949

TABLE 152: Years highest degrees awarded grant recipients in programs in the Division of Biotic Systems and Resources in fiscal years 1980 and 1981, according to program (mean and standard deviation rounded to nearest year).

	1980					1981				
PROGRAM	N	MEAN	STAND. DEV.	MODE/N	RANGE	N	MEAN	STAND. DEV.	MODE/N	RANGE
Systematic Biology	232	1962	12	1961/7 1969/7 1970/7	1916-1980	240	1964	10	1971/16	1933-1980
Biological Research Resources	60	1962	8	1969/6 1969/6	1940-1978	61	1963	8	1968/6	1940-1979
Pop. Biol. & Phys. Ecology	31	1968	8	1971/5 1972/5 1977/5	1936-1977	40	1968	9	1972/5	1936-1979
Ecology	36	1967	9	1961/4 1968/4 1975/4	1940-1979	38	1969	8	1975/5	1951-1979
Ecosystems Studies	24	1963	8	1968/4	1948-1977	25	1965	6	1968/4	1951-1975

TABLE 153: Years highest degrees awarded grant applicants (declined) in programs in the Division of Biotic Systems and Resources in fiscal years 1980 and 1981, according to program (mean and standard deviation rounded to nearest year).

	1980					1981				
PROGRAM	N	MEAN	STAND. DEV.	MODE/N	RANGE	N	MEAN	STAND. DEV.	MODE/N	RANGE
Systematic Biology	113	1965	10	1961/7 1969/7 1970/7	1939-1980	140	1967	9	1977/9	1940-1980
Biological Research Resources	60	1962	8	1969/6	1940-1978	61	1963	8	1968/6 1969/6	1940-1979
Pop. Biol. & Phys. Ecology	28	1970	7	1974/4	1956-1979	40	1968	9	1972/5	1936-1979
Ecology	15	1969	8	1968/2 1972/2 1974/2	1950-1977	24	1966	10	1948/3 1975/3	1948-1980
Ecosystems Studies	24	1963	8	1968/4	1948-1977	25	1965	6	1968/4	1951-1975

TABLE 154: Sex of grant recipients in programs in the Division of Biotic Systems and Resources in fiscal years 1980 and 1981, according to program.

PROGRAM	1980 FEMALE N	1980 FEMALE %	1980 MALE N	1980 MALE %	1980 NO DATA N	1980 NO DATA %	1981 FEMALE N	1981 FEMALE %	1981 MALE N	1981 MALE %	1981 NO DATA N	1981 NO DATA %
Systematic Biology	17	7.26	208	88.89	9	3.85	22	9.09	197	81.40	23	9.50
Biological Research Resources	5	8.33	54	9.00	1	1.67	3	4.92	55	90.16	3	4.92
Pop. Biol. & Phys. Ecology	---	---	28	87.50	4	12.50	---	---	35	87.50	5	12.50
Ecology	2	5.56	31	86.11	3	8.33	3	7.89	35	92.11	---	---
Ecosystems Studies	---	---	20	83.33	4	16.67	---	---	18	72.00	7	28.00

TABLE 155: Sex of grant applicants (declined) in programs in the Division of Biotic Systems and Resources in fiscal years 1980 and 1981, according to program.

PROGRAM	1980 FEMALE N	1980 FEMALE %	1980 MALE N	1980 MALE %	1980 NO DATA N	1980 NO DATA %	1981 FEMALE N	1981 FEMALE %	1981 MALE N	1981 MALE %	1981 NO DATA N	1981 NO DATA %
Systematic Biology	12	10.53	102	89.47	---	---	15	10.64	124	87.94	2	1.42
Biological Research Resources	---	---	7	58.33	5	41.67	---	---	14	73.68	5	26.32
Pop. Biol. & Phys. Ecology	3	10.71	25	89.29	---	---	---	---	29	96.67	1	3.33
Ecology	2	13.33	13	86.67	---	---	2	8.00	23	92.00	---	---
Ecosystems Studies	3	15.79	16	84.21	---	---	1	5.26	16	84.21	2	10.53

TABLE 156: Types of institutions where grant recipients in the Division of Biotic Systems and Resources work, according to program (pooled fiscal years 1980 and 1981).

PROGRAM	FREE-STANDING MUSEUM N	%	UNIVERSITY/ COLLEGE N	%	SOCIETY/ ASSOCIATION N	%	INSTITUTE N	%	INDIVIDUAL N	%	APPLIED GOVERNMENT AGENCY N	%
Systematic Biology	70	14.71	393	82.56	5	1.05	7	1.47	1	0.21	---	---
Biological Research Resources	53	43.80	56	46.28	1	0.83	11	9.09	---	---	---	---
Pop. Biol. & Phys. Ecology	2	2.78	70	97.22	---	---	---	---	---	---	---	---
Ecology	2	2.70	68	91.89	---	---	4	5.41	---	---	---	---
Ecosystems Studies	3	6.12	43	87.76	---	---	3	6.12	---	---	---	---

TABLE 157: Types of institutions where grant applicants (declined) in the Division of Biotic Systems and Resources work, according to program (pooled fiscal years 1980 and 1981).

PROGRAM	FREE-STANDING MUSEUM N	%	UNIVERSITY/ COLLEGE N	%	SOCIETY/ ASSOCIATION N	%	INSTITUTE N	%	INDIVIDUAL N	%	APPLIED GOVERNMENT AGENCY N	%
Systematic Biology	22	8.63	223	87.45	1	0.39	5	1.96	2	0.78	2	0.78
Biological Research Resources	5	16.13	23	74.19	---	---	1	3.23	---	---	2	6.45
Pop. Biol. & Phys. Ecology	3	5.17	53	91.38	---	---	2	3.45	---	---	---	---
Ecology	2	5.00	37	92.50	---	---	1	2.50	---	---	---	---
Ecosystems Studies	---	---	28	90.32	---	---	2	6.45	---	---	1	3.23

SECTION 7: SUMMARY

OVERVIEW OF THE SYSTEMATICS COMMUNITY

Three broad parameters of the systematics community are examined in this study: physical resources, individual systematists, and financial resources. The data compiled, in the aggregate, describe the average or modal physical resource or individual systematist. They provide baseline information against which specific institutions, collections, or individuals can draw conclusions as to where they stand in relation to the community as a whole. The emphasis of a specific collection (e.g., mammals, plants, insects) will, to a great extent, determine requirements for personnel, space, and so on, not necessarily consistent with the modal or average figures presented. Likewise, the research focus (e.g., taxa studied, geographic emphasis) and place of employment will alter an individual's position with respect to the community mode or average.

From the outset of this study, one of our most difficult problems has been the extremely diverse nature of the community. Variations in institutional administrative models (dictated by different goals), inconsistencies in the unit managed as a collection (based on institutional policies and traditions), and the organism orientation of individual researchers all are factors contributing to the diversity found in the systematics community. As a consequence of this study, we are now able to provide some estimates of the diverse elements that constitute the systematics community. The following section provides a general overview of the physical resources, individual researchers, and financial resources in the systematics community.

Institutions

Of the responding institutions that maintain systematics collections, about 68% are colleges or universities, 17% are freestanding museums, and 9% are biological surveys/laboratories. Twenty-nine percent of the collections are maintained in freestanding and academic museums. About half (56%) of the collections are maintained in academic departments. Many of these collections are not recognized administratively by their institution (Table 4A). Overall,

public (tax supported) institutions maintain 69% of the collections, and on the average nearly 6% of the collections are maintained by individuals independent of an institution (Table 4C).

The collection management unit within these institutions also varies, based on the breadth of taxonomic coverage of specimens in the collection. On average, 9% of the collections are managed as units based on higher taxonomic aggregates, (i.e., lower vertebrates, higher vertebrates, zoology (all animals), and biology (all organisms)) (Table 4B). While only 29% of the collections are maintained in freestanding and academic museums (Table 4A), many of these collections are among the largest of their kind.

Finally, of the 3,869 collection facilities identified in preparation for the survey of physical resources, 169 (4.3%) respondents returned the questionnaire without providing data (Table 3B). Many of these respondents indicated that their collections were no longer being maintained.

Individual Systematists

Based on responses to the survey of individual systematists, we estimate that there are between 8,000 and 10,000 systematists in the United States. Extrapolating from the proportional distribution of respondents according to discipline-area, 28.6% of the systematists are in Botany; 19.6% are in Entomology; 15.1% work with Invertebrates; 10.1% are in Herpetology; 7.0% are in Ichthyology; 6.5% are in Mammalogy; 3.0% are in Ornithology; 2.9% are in Vertebrate Fossils; 2.1% are in Microbiology; and 1.8% are in Invertebrate Fossils. Three percent of the systematics community are generalists not specializing in a particular group of organisms (Table 5).

About 85% of the community are established professionals; 13.4% are graduate students or hold post doctoral positions. The remainder of the community are lay persons (hobbyists), undergraduates, and precollege students (Table 6).

Overall, at the time of the survey, the modal age in the community was 41 and the mean age was 44. The age of individuals in the community spans nearly 70 years, ranging from 21 to 90 years old (Table 7). About 87% of the community are males (Table 8), while roughly 72% of respondents are married (Table 9).

Over 95% of the community are Caucasoid. The most prevalent minority race in the community is Mongoloid (except American Indians), which represents slightly more than 1% of the community (Table 10). Finally, 94.5% of the community are native to the United States; 4.5% are naturalized citizens (Table 11).

It is of interest to compare the proportional distribution of collections and systematists, according to discipline-area (Table 158). In general, the relative proportion of collection resources and systematists is comparable. There is a discrepancy, however, between the percentage of Ornithology collections (10% of all collections) and the percentage of Ornithologists (3% of responding systematists). The reverse relationship is reflected for Invertebrates (7% of the collections and 15% of responding systematists). The implication of these relationships is that a relatively large number of Ornithology collections are serving a relatively small number of professionals, while the reverse is true in Invertebrates. Nevertheless, taking into account the number of taxa and relative sizes of collections in these discipline-areas, Ornithology may in fact be overrepresented in terms of the number of professionals while Invertebrates is underrepresented.

Financial Resources

According to Escherich and McManus's Sources of Federal Funding for Biological Research (1983: Association of Systematics Collections, 83 pages), a total of $3.5 billion was budgeted in fiscal year 1982 by 34 federal agencies and/or departments (excluding the NSF) for "...extramural research in organismic biology." Research in organismic biology was defined as being directed toward gaining a better understanding of a particular organism (or group of organisms) rather than probing into biological processes in which an organism is only a vehicle in which such studies are undertaken (e.g., laboratory rats and mice). While the majority of the funds identified by Escherich and McManus are presently being invested in applied research problems (i.e., biomedicine, agriculture, environmental quality), at least a portion of these funds are available to systematists.

In response to the demographic survey, individuals reported receiving systematics oriented grants or contracts totalling over $165,000,000 from a variety of sources for the five years between 1977 and 1982 (Table 109). Fifty-six

percent of the awards (number of grants/contracts) were from federal agencies; 7% were from state, county, or local government programs; 15% were from the respondents' institutions; and 12% were from private (not-for-profit) sources (Table 110A). The remaining 10% were from private industry, foreign governments, and other miscellaneous sources.

Based on total dollars awarded, 82% of the funds were from federal programs; 6% were from state, county, or local government programs; 1% was from respondents' institutions; 3% were from private (not-for-profit) sources; 6% were from private industry; and the remaining 2% were from foreign governments and other miscellaneous sources. Overall, 27% of the number of grants/contracts awarded and 40% of the dollars awarded were from the NSF (Table 110A). The NSF is the only federal agency that provides funds exclusively for "pure" research in systematic biology; programs in other government agencies are more "mission-oriented," emphasizing goals and/or objectives of the agency.

TABLE 158: Proportional distribution of collections and personnel according to discipline-area (taken from Tables 4B and 5).

DISCIPLINE	PROPORTION COLLECTIONS (N=1142)	PROPORTION INDIVIDUALS (N=2555)
MAMMALOGY	11%	7%
ORNITHOLOGY	10%	3%
HERPETOLOGY	6%	10%
ICHTHYOLOGY	8%	7%
VERTEBRATE FOSSILS	5%	3%
INVERTEBRATE FOSSILS	5%	2%
INVERTEBRATES	7%	15%
ENTOMOLOGY	15%	20%
BOTANY	26%	29%
MICROBIOLOGY	6%	2%
OTHER	---	3%

Within the NSF, the principal programs that provide support for research and facilities in systematic biology are within the Division of Biotic Systems and Resources (BSR). Additionally, systematics is supported within the NSF through a diverse array of programs outside of BSR, including Stratigraphy and Paleontology, Biological Oceanography, International Programs, and Anthropology. Data presented in this report are limited to the five programs in BSR.

All five programs in BSR (Ecology, Population Biology and Physiological Ecology, Ecosystem Studies, Systematic Biology, and Biological Research Resources) provide some support for organism-oriented studies; however, the primary sources of support for the community are the Systematic Biology and Biological Research Resources programs.

PRESENT STATUS OF THE SYSTEMATICS COMMUNITY

Systematics Research Resources

Most of the figures presented below represent the average or modal systematics collection across discipline-areas and may not fairly reflect the condition in a particular discipline. For example, the overall average collection has approximately 177,000 specimens, occupies 3,230 sq. ft., employs 0.5 curators and 0.4 preparators, and has an annual operating budget of approximately $3,700. The average response to a question from a particular discipline-area can be determined by consulting the referenced tables in the body of the report.

In the aggregate, about 191,000,000 specimen-units are maintained in 1,080 of the 1,142 collections represented in this report (Table 12). Extrapolating from these numbers, the 3,869 collections identified in preparing for the survey could contain over 680,000,000 specimen-units.

Of the nearly 191,000,000 reported specimen-units, about 64% (122,000,000) are catalogued; Invertebrate and Vertebrate Fossil collections have the largest percentage of uncatalogued specimen-units. The largest collections are those of Entomology, Botany, Invertebrates, Invertebrate Fossils, and Ichthyology.

These contain 176,900,000 specimen-units (including lots) or 93% of all specimen-units. Entomology alone maintains 103,400,000 specimen-units (54%) (Table 20).

About 30% of the collections maintain various kinds of type specimens; 25% maintain holotypes (Table 13).

Ancillary, or supplemental, collections are valuable adjuncts to the principal collection and represent significant research resources. Between 50% and 90% of the collections in each discipline-area except Microbiology (43%) maintain a diverse array of supplemental collections designed to enhance the research value of the principal systematics collection (Table 15). For the most part, the focus of these supplemental collections is on the research needs of the disciplines as well as traditions in the field. Vertebrate collections rely on original field notes, dry skeletal material, and 35mm slides; fossil collections have photographic prints, 35mm slides, and original field notes; invertebrate, entomology, and botany collections typically contain 35mm slides, original field notes, photographic prints, and alcoholic specimens. Original field notes are the most common supplemental collection maintained in all discipline-areas. Overall, the most common supplemental collections provide further documentation of the organisms in the principal collections.

An average of 3,230 square feet is required for specimen storage, management, and other spatial needs associated with a typical systematics collection. Fifty-two percent of the space is allocated for specimen-unit storage; 20% for laboratories, 12% for offices, 7% for libraries, and 9% for other needs, such as supply storage, preparation space, and the like (Table 21).

Collections grow at an average of 3% per year, resulting in the addition of nearly six million specimen-units per year (Table 28). A total of 24,400,000 specimen-units were added to 1,007 collections during the five year period 1976-1981. The largest influx of specimen-units appears to be from gifts and grant supported professional research (Tables 30 and 31). In 1980, over 32% of the specimen-units acquired were the result of gifts; 26% resulted from grant supported research; 19% resulted from unsupported professional research. Across the discipline-areas, Invertebrates had the largest percentage of collections (35%) that acquired new specimens as a result of grant supported research. Exchange of specimens is a significant factor only in Entomology and Botany.

Given the present growth rate of 3% per year and an average collection of 180,000 specimen-units, most collections can be expected to need 50% more space and storage facilities (i.e., cases, jars, etc.) in 15 to 16 years. About 50% of the respondents indicated that they would need, in the aggregate, over 400,000 square feet for collection storage within the next five years (Table 32). At the modest rate of $100.00 per square foot, the needed space will cost approximately $40,000,000. Given greater emphasis on floral/faunal surveys, the present growth rate of collections can be expected to increase, requiring more space and facilities sooner than anticipated.

There is one Full Time Equivalent (FTE) curator for every 1.95 collections and one FTE preparator for every 2.71 collections (Tables 27A and 27B). When all classes of personnel are pooled there are 1.5 FTE personnel per collection in the United States. Volunteers (16.2% of the workforce) and students (25.1% of the workforce) are the predominant classes of personnel maintaining collections (Table 25B). For the most part, collections are maintained and managed by part-time personnel.

Of the 903 collections represented by responses to inquiries regarding operating budgets, about 14% had no operating budget in 1981 (Table 99). Half of the discipline-areas have average collection budgets (excluding salaries) below $5,000; 70% of the discipline-areas have average collection budgets below $7,000. Overall, the average operating budget in 1981, for collections whose budget information was made available (excluding the United States Geological Survey), was $5,620. While Botany collections are among the largest (averaging 115,383 specimen-units per collection; Table 12), the average annual operating budget in 1981 was about $3,700 per collection (third lowest among the 10 discipline-areas recognized in the physical resources survey). Over five years (1976-1981), however, collection budgets in 60% of the discipline-areas kept pace with inflation or moved ahead of inflation (assumed to be 10% per year) (Tables 99 and 100). Those average collection budgets not keeping pace with inflation were in Mammalogy, Invertebrate Fossils, Botany, and Microbiology. The average annual increase in collection operating budgets was approximately $500 per year for this period.

Each discipline-area has developed different methods to relate specimen-units with associated data (i.e., catalogues, collection organization, specimen labeling conventions and procedures, specimen preparation requirements) (Table

17). Irrespective of the method employed, the accessibility of specimen-related information is dependent upon constant maintenance and updating of the collection. Biological collections are an effective resource only when adequately catalogued and curated. Only then are the specimen holdings available to the systematics community and other users. Therefore, collection personnel are needed to accession and catalogue new material, update pertinent data on extant specimens, and oversee collection services.

Computers are used to manage specimen-related data in 21% of the facilities surveyed (Table 16). Of those using computers to catalogue collection information, on the average, approximately, 40% of their collections are computerized. Computers have promise as a tool in cataloguing collections; however, this technology is relatively expensive and beyond the limits of most collection budgets. Attempts to use the cheapest computer systems often exacerbate problems rather than alleviate them (Sarasan and Neuner, Museum Collections and Computers, 1983: Association of Systematics Collections, 292 pages). For example, use of computers in cataloguing requires that collection personnel possess skills which may presently be lacking. Further, most institutions at present do not offer competitive salaries to attract and hold persons skilled in using computers.

Libraries greatly facilitate research activities associated with systematics collections. Forty-five percent of the collections have a library associated with their collections (Tables 24A and 24B). Sixty-three percent of the respondents have access to a centralized institutional library that has holdings pertinent to their disciplines.

Protection against hazards that can reduce the usefulness of specimen-units or ultimately destroy these collection resources needs more study (Table 22). Thirty-eight percent of respondent collections have no fire protection; 50%, no temperature control; 17%, no pest protection (if appropriate); 64%, no humidity control; 42%, no water damage protection; and 22%, no theft protection. Supplemental collections, particularly original field notes, are among the most vulnerable collection resources and are rarely given the same degree of care as the specimens in the principal collections.

Systematics collection facilities provide an extensive array of services to the broader research community and the public (Tables 33, 34, 36, and 38-42). These services are summarized in Table 159.

TABLE 159: Percentages of collections offering services, in rank order.

SERVICE OFFERED	COLLECTIONS PROVIDING SERVICE Number	Percent
Loan of specimens	913	80
Identification of specimens	866	76
Visitor's research facilities	854	75
Access to specimens in collections	828	72
General informational services	779	68
Storage of specimens	469	41
Specimen preparation	457	40
Loan of type specimens	390	34
Training of collection managers	233	20
Computer/data management	180	16
Isolation of living cultures	112	10
Maintenance of genetic stocks	94	8

As noted in Table 159, these services can be divided into three categories. In the first category, services are available from the majority of collections and generally do not require a major expense to perform them. The second category of services is more restricted in availability (34% - 41% of collections) and, to a certain extent, they rely on the availability of space and technical personnel; the limited loan of type specimens may be correlated with the perceived risk of losing the material. In the third category, the services are relatively rare and depend on the collection having sophisticated equipment and qualified personnel to provide them.

Loan of specimens is the most common service provided. In 1980, 729 (64%) of the collections loaned a total of 950,311 specimens in 16,809 separate actions (Table 35). Given the fact that every outgoing loan must also be managed when it is returned and assuming that 1980 was not an atypical year for loan transactions, approximately 33,500 loan transactions are handled in an average year. This would mean that each collection processes an average of 46 loan shipments per year.

For the most part the services available through collections are provided as a "professional courtesy" to other professionals in the biological community; however, fee schedules have been developed in a number of institutions/collections for services provided to commercial enterprises or government agencies.

While biological collections serve important educational functions and serve as archives of our natural heritage, the collections realize their greatest value in systematics when used as research resources. Today, research in systematics relies on equipment and facilities that have not traditionally been associated with systematic studies. Table 160 summarizes the extent to which equipment and facilities are available in the community (data extracted from Table 23). Of note is the fact that only photographic facilities, computer systems, and histology laboratories are available in more than half the collections. Electrophoretic facilities, gas chromatography equipment, spectrophotometers, and transmission and scanning electron microscopes are available in less than 43% of the collections. The remaining types of equipment/facilities are generally limited in their applicability only to certain disciplines in systematic biology; hence, the relatively small percentages probably are not fair estimates of availability of the equipment to those that need them.

TABLE 160: Equipment/facilities available in the systematics community, in rank order according to availability (data extracted from Table 23).

TYPE OF EQUIPMENT/ FACILITY	COLLECTION FACILITIES WITH EQUIPMENT N	%
Photography	777	68.04
Computer	660	57.79
Histology Laboratory	576	50.44
Electrophoresis	492	43.08
Gas Chromatography	487	42.64
Spectrophotometer	484	42.38
Scanning Electron Microscope	469	41.07
Transmission Electron Microscope	427	37.39
Sound Recording	370	32.40
Mass Spectrometer	339	29.68
X-Ray	336	29.42
Biochemical Laboratory	302	26.44
Sound Analysis	182	15.94
Motion Analysis	123	10.77
Other[1/]	121	10.60
Radiometric Dating	117	10.25

[1/] Compound microscope, camera, camera lucida, aquaria systems, field vessel or vehicle, scuba facilities.

Individual Systematists

Educational Background

The majority of systematists (60.3%) attained doctoral degrees from institutions in 10 states: California, New York, Michigan, Illinois, Massachusetts, Kansas, Ohio, Florida, North Carolina, and Texas (Table 49). Nearly 54% of the master's degrees reported by respondents were awarded in the same 10 states. For the most part these advanced degrees are granted from state-supported colleges or universities (76.9% of doctorates and 79.9% of masters) (Table 53). About 34% of the bachelors degrees are granted from private colleges or universities.

Respondents were granted 355 doctorates between 1970 and 1974, and 332 between 1975 and 1979 (Table 51). Three hundred three master's degrees were granted respondents between 1975 and 1979, and 273 were granted in the previous five year period. Overall, there appears to be a trend toward reduction in the number of advanced degrees being granted in systematics. This trend is further substantiated by the number of graduate students that respondents reported advising during the 1980-1981 and 1981-1982 academic years (see page 239).

Nearly half of the individuals who enter systematics do so primarily because of the influence of a "Key Personality" (Table 54). Other factors that have a significant effect on their decision are "Key Courses" and pursuing a "Hobby" in natural science. Perceptions of "Career Opportunities" do not play a significant role in entering a discipline in systematic biology, except for Microbiologists.

Overall, 80.1% of the respondents received formal training in systematics; 92.3% of the respondents in Botany received such training (Table 55); 31.2% were required to participate in a special field course in conjunction with their graduate programs (Table 56). Approximately 25% of the respondents spent some time at a terrestrial or marine field station (Table 57).

Respondents reported taking a diverse array of methodological courses while graduate students (Table 60). With the exception of foreign languages and basic statistics, there appear to be no discrete trends that can be identified, except possibly the lack of uniformity in the course offerings reported by re-

spondents. In part this diversity is due to the broad time span in which respondents were taking these courses. Many courses now offered were not available even a few years ago. Of the ten courses most commonly taken during graduate careers, five are directed toward communication skills (foreign language, public speaking, technical writing, photography, and scientific illustration) and five enhance research skills (basic statistics, computer programming, electron microscopy, multivariate statistics, and electrophoresis).

While most respondents received training in a foreign language, over 10% satisfied a language requirement by demonstrating a proficiency in computer programming (Table 61).

Of every three doctoral students addressing a field-oriented research problem, only one undertook field work in the United States (Table 58). Likewise, of every four doctoral students needing to visit a museum in conjunction with their research, one visited museums in the United States (Table 59). Researchers in Vertebrate Fossils are particularly dependent upon museum collections for completion of their graduate programs.

Financial assistance, primarily through teaching assistantships and research assistantships, is essential to finance graduate education; research assistantships were held by 43.5% of the respondents while working on their doctorate (Tables 62A and 62B). Curatorial assistantships were held by slightly less than 7% of respondents at the master's level. These assistantships are very important in systematic biology because there is very little formal training available in collection management and specimen preparation techniques. Curatorial assistantships, in addition to serving as a source of funding for students, also provide apprenticelike training in curatorial methods.

Employment

Nearly 43% of the respondents are tenured faculty members; less than 2% hold endowed chairs (Table 67). About 64% of the respondents work in four year colleges, while 15.3% work in museums and 13.4% for state or federal government agencies. Few work for industry (4.7%) (Table 64). The large percentage of respondents employed at colleges is strongly correlated with the large per-

centage of collections maintained in academic departments. Many valuable regional collections are initiated and maintained by individual systematists at academic institutions, in conjunction with their research or for teaching purposes.

The overall modal salary for a systematist is $25,001 to $30,000 (Table 66). Salaries reported range from below $10,000 to above $50,000 per year. On a discipline-area basis, modal salaries ranged from $20,000 to $50,000 per year. Thirty-two percent of the systematists hold nine month appointments; 50.0% have twelve month appointments (Table 65).

On the average, individuals work 46.8 hours per week (Table 74). This time is proportionally allocated for research (41.1%), teaching (21.0%), administrative duties (10.7%), curating (7.9%), professional services (6.5%), advising students (4.7%), and public/extension services (2.8%). Based on a median salary of $27,500 per year, and given an average 47 hour week, the average systematist earns about $11.30 per hour.

The majority of individuals (39.9%) in the community reported holding one position during their career after receiving their highest degree (Table 68). The career goals of 68.0% of respondents involve research at colleges or museums (Table 70). Some 64.4% planned to teach in a university; 32.8% planned to do research in a museum, while 26.3% desired to curate collections.

Nearly 44% of the systematists work on pure research problems and 41.8% work on either pure or applied research problems (Table 71). Only 5.8% indicated an exclusive interest in applied research. Most (83.2%) indicated that their positions are consistent with career goals and that their positions are also dependent on their graduate training (Tables 72 and 73).

The majority (80.1%) of systematists continue to work in the same discipline in which they received their highest degree; only about 40% changed the focus of their research to another taxonomic group (Table 76). Most systematists (61.5%) work on interspecific studies (Table 77). Nearly 67% of the systematists use collections in their own institution; about 50% rely on collections in other institutions. Overall, 50.0% of the respondents maintain a private collection. This was especially true in Microbiology (83.0%), Entomology (65.2%), Invertebrates (62.7%), and Invertebrate Fossils (61.7%) (Table 81).

To keep abreast of advances in their fields, systematists rely on scholarly journals (94.1%), peer interaction (84.0%), and scholarly society annual meetings (78.3%) (Table 79). A relatively smaller percentage attend workshops/ short courses (28.8%) or enroll in scheduled courses (18.9%). The average systematist attends about 2.3 meetings per year (Table 80).

Productivity

The number of master's level students under the direction of respondents decreased 12.8% between 1980-1981 and 1981-1982 (Table 82). The number of doctoral students increased slightly in the same period of time (Table 83). Most advisors supervised one to three graduate students.

Over 20,000 peer-reviewed papers were reported as published between 1976 and 1981 by 88.8% of the respondents (Table 86). Therefore, an average of 1.8 papers were published each year by these individuals. Overall, 27.1% of the respondents published an average of 2.2 books each during their careers (Table 87). The mean year in which respondents first published papers was 1965; the overall modal year was 1976 (Table 88).

Between 23.3% and 28.9% of the vertebrate zoologists responding applied for and received permits to work on endangered species; only 10.1% of the botanists report having permits to work on endangered species (Table 84).

Financial Resources

Collections depend on a variety of sources for support (Table 105B). Forty-four percent of the collections rely on state funding for operating budgets, 14% rely on federal sources, and 23% depend upon private sources, endowments, foundations, and other sources. The principal source of federal funding exclusively for collections was the National Science Foundation (NSF), followed by the National Institutes of Health (NIH) (Tables 106A and 106B).

Research grants do not generally provide direct funds for collection support; only 15% of the research grants reported by respondents to the physical resources survey indicated that such funds were available (Table 104).

It is clear that NSF support for collections (excluding Microbiology) is correlated with the number of curators in a discipline; the larger the population of curators, the more funds were obtained (Table 161). Funding levels do not correlate well with collection size or complexity (i.e., diversity of taxa contained in the collection). The three discipline-areas with the smallest collections (Ornithology, Herpetology, and Mammalogy), with a total of 5% of the specimens and 24% of the curators, received 23% of the total funds. The invertebrate discipline-areas (Entomology plus Invertebrates), with 63% of the specimens and 25% of the curators, received 21% of the funding. Botany received the highest percentage of funding (39%) with 17% of the specimens and 32% of the curators.

TABLE 161: Collections (excluding Microbiology) ranked according to collection size based on numbers of specimen-units, and showing size relationship to number of curators responding, number of units uncatalogued, and the NSF funds spent for collection support.

DISCIPLINE-AREA	COLLECTION SIZE (No. specimen-units in millions) N	%	NUMBER OF CURATORS RESPONDING N	%	NUMBER UNITS UNCATALOGUED (in thousands) N	%	NSF FUNDS AWARDED (in thousands)	PERCENT DOLLARS AWARDED
ENTOMOLOGY	103.4	54.25	236	18.03	40,588.6	58.45	4,207.7	17.11
BOTANY	32.9	17.26	420	32.09	4,727.5	6.81*	9,657.9	39.28
INVERTEBRATES	16.4	8.60	94	7.18	2,480.3	3.57	992.3	4.04
INVERTEBRATE FOSSILS	16.2	8.50	88	6.72	13,690.1	19.71	585.5	2.38
ICHTHYOLOGY	8.0	4.20	106	8.10	3,695.2	5.32	2,937.6	11.95
VERTEBRATE FOSSILS	4.4	2.31	55	4.20	3,428.3	4.94	528.5	2.15
ORNITHOLOGY	3.7	1.94	114	8.71	266.0	0.38	1,894.9	7.71
HERPETOLOGY	3.2	1.68	69	5.27	436.3	0.63	1,754.5	7.14
MAMMALOGY	2.4	1.26	127	9.70	134.3	0.19	2,027.5	8.25
TOTAL	190.6	---	1309	---	69,446.6	---	24,586.4	---

*Written/printed catalogues are not generally used in Botany; the collection is said to serve as the catalogue.

Individual systematists rely on a diverse array of sources to support their research programs. Fifty percent rely on grants and/or personal income; 38% rely on the fact that their research is directly job-related; and 14% rely on contract funding (Table 108). A total of 3,246 grants/contracts were reported received by 58% (1,487) of the respondents between 1977 and 1982 (Table 109). Therefore, the average grant recipient received 2.2 awards during this five-

year period. Of these 3,246 grant/contracts reported by respondents, funding levels were provided on 3,026 awards totalling slightly over $165,000,000. Based on the number of grants/contracts for which funding was reported and the total funds awarded, the average grant/contract was awarded for approximately $55,000. Given an average of 2.2 awards per grant recipient, each received a total of about $121,000 over the five year period, or roughly $24,000 per year.

The primary source of federal support for research in systematics is the NSF (27.1% of the number of awards received by respondents came from the NSF) (Table 110A). Based on the total dollars awarded to respondents, the NSF provided 39.6% (nearly $66,000,000) of the funds during the five years between 1977 and 1982.

Within the NSF, the Systematic Biology and Biological Research Resources programs serve as the primary sources of funding for research and facilities in the systematics community. Nevertheless, the Population Biology and Physiological Ecology, Ecology, and Ecosystem Studies programs also provided some funding in the systematics community.

Grant recipients in 1981 tend to be older in the Systematic Biology program (average age 46) than in the Population Biology and Physiological Ecology or the Ecology programs (average age 40) (Table 151). In 1981 the average grant recipient in Systematic Biology received his/her doctorate 17 years earlier, while in Population Biology and Physiological Ecology the average grant recipient received his/her doctorate nine years earlier (Table 152). The average age of an individual systematist was 44 in 1981 (Table 7).

From an institutional perspective, 83% of the awards made from the Systematic Biology program in 1980 and 1981 went to individuals in colleges or universities; 15% went to researchers in freestanding museums (Table 156). In contrast, 44% of the funds awarded from the Biological Research Resources program in the same time span went to individuals in freestanding museums. On the average, 92% of the awards from Population Biology and Physiological Ecology, Ecology, and Ecosystem Studies went to individuals in universities.

PRIORITIES FOR SUPPORT FROM THE NATIONAL SCIENCE FOUNDATION

From the perspective of respondents to the physical resources survey (Table 48), priorities for additional support to assure optimal use of their collection facilities are: **First:** Doctoral level curators; **Second:** Technical staff; and **Third:** Additional storage space.

From the perspective of individual researchers, priorities for funding under the Biological Research Resources Program are in rank order (Tables 93 and 94): **First:** Collection management personnel; **Second:** Computerization of specimen data; **Third:** Updating and revising specimen data; **Fourth:** Reorganization of collections; and **Fifth:** Renovation or construction of collection facilities.

From the perspective of individual researchers, priorities for funding research under the Systematic Biology Program are in rank order (Tables 89A and 89B): **First:** Research resulting in taxonomic revisions or monographs; **Second:** Floral or faunal surveys; **Third:** Organismic characterizations using a variety of techniques but without an immediate intent to revise taxonomic relationships; **Fourth:** Collaborative Research; and **Fifth:** Predoctoral research programs.

THE SYSTEMATICS COMMUNITY
REPORT TO THE NATIONAL SCIENCE FOUNDATION

APPENDIX I-A

QUESTIONNAIRE USED FOR SURVEY OF PHYSICAL RESOURCES

[redacted] = Question not used in analysis.

APPENDIX I-A

ERAL

Name of curator-in-charge directly responsible for the collection:

_____

Acronym of the institution and, if different, the collection:

_____ Institution _____ Collection

Please check the administrative type of your facility:

	Academic Departmental Collection	Academic Public Museum	Free-standing Institution [1]	Laboratory or Biological Survey
Public				
Federal	_____	_____	_____	_____
State	_____	_____	_____	_____
County	_____	_____	_____	_____
Municipal	_____	_____	_____	_____
Private	_____	_____	_____	_____
Individual	_____	_____	_____	_____

[1] museum, herbarium, botanical garden, zoological garden, or arboretum

List other collections in your institution.

Name and Type of Collection	Mailing Address, if different from above
a. _____	a. _____
b. _____	b. _____
c. _____	c. _____

OMB No: 3145-00
Expiration date: 7/31/

SURVEY OF RESOURCES IN SYSTEMATIC BIOLOGY

This questionnaire is to be completed only for the collection shown in the upper righ hand corner of the cover. If you are responsible for more than one collection, you should complete a differently colored questionnaire for each collection. If you do n receive the other questionnaires that you require within 30 days, please notify us so that we may send them as quickly as possible. If the collections you curate absolute cannot be separated according to storage space, maintenance, and/or budget, then complete only one of the questionnaires you receive, indicating, when a question is starred, to what collection your response refers. A list of the collection types for which surveys are available is provided below:

Botany
(including algae and fossil plants)
Entomology
(arachnids and insects)
Herpetology
Ichthyology
Invertebrate Fossils
(all fossil invertebrates)
Invertebrates
(all invertebrates except insects and arachnids)
Mammalogy
Microbiology
(protozoa, bacteria, and viruses)
Ornithology
Vertebrate Fossils

If your collection has been registered with the Association of Systematics Collection and if the taxonomic information requested in this survey is comparable, we have included, to aid you in completing this questionnaire, a copy of the data you provide earlier. If you would like to elaborate further on any question in this survey, pleas use additional sheets of paper.

Information provided will be treated as confidential. In all questions, provide exac information, if possible. Please approximate when exact information is not available If you have any questions about this survey, please contact:

Nancy J. Wert
Project Coordinator
Association of Systematics Collections
Museum of Natural History
University of Kansas
Lawrence, Kansas 66045

Please return this questionnaire in the enclosed postage-paid envelope.

5. In your collection, what is the approximate square footage occupied by:

Offices	_____sq. ft.	Others (PLEASE SPECIFY):	
Collections	_____sq. ft.	_____	_____sq. ft.
Laboratories	_____sq. ft.	_____	_____sq. ft.
Library/Reading Room	_____sq. ft.	_____	_____sq. ft.

*6. Based on your current growth rate, what are your collection's additional space requirements (in square feet) for the next five years? _____sq. ft.

7. Are your collections protected against:

Fire	_____ Yes	_____ No
Temperature fluctuation	_____ Yes	_____ No
Pests	_____ Yes	_____ No
Humidity fluctuation	_____ Yes	_____ No
Water damage	_____ Yes	_____ No
Theft/Vandalism	_____ Yes	_____ No

Others (PLEASE SPECIFY): _____

_____

PERSONNEL

*8. Number of personnel associated with your collection:

	Number	Full-Time Equivalent Appointment [2]
Curators	_____	_____
Technicians/Preparators	_____	_____
Clerical Personnel	_____	_____
Post Doctoral Personnel	_____	_____
Graduate Students	_____	_____
Undergraduate Students	_____	_____
Hourly Personnel	_____	_____
Volunteers	_____	_____
Others (PLEASE SPECIFY): _____	_____	_____
_____	_____	_____

[2]Forty hours per week.

APPENDIX I-A

9. Please provide the names of all on-site professionals associated with your collection. (Your response will insure that each professional receives a questionnaire addressing the needs of the individual researchers which is to be distributed in August-September, 1982).

Name	Position
a. _____	a. _____
b. _____	b. _____
c. _____	c. _____
d. _____	d. _____
e. _____	e. _____
f. _____	f. _____

10. Indicate the relative importance of volunteers to the maintenance of your collection. (PLEASE CIRCLE ONE)

Critical Very important Important Minor importance Not important

FISCAL

*11. What was the total operating budget, excluding salaries, for your collection in your 1980 fiscal year? $_____

*12. What was the total operating budget, excluding salaries, for your collection in your 1975 fiscal year? $_____

13. If the effective purchasing power of your budget has been reduced over the past five years, please indicate the cause(s):

_____ Inflation
_____ Adjustments in collection policies
_____ Adjustments in administrative priorities
_____ Loss of extramural funding
_____ Others (PLEASE SPECIFY): _____
_____

14. If your budget has not kept pace with inflation, or has been reduced in the past five years, please indicate those budgetary areas that have been adjusted. (PLEASE NUMBER ACTIONS IN ORDER OF THE FIRST MADE (1), SECOND (2), THIRD (3), ETC.)

_____ No cutbacks necessary
_____ Reduced professional staff
_____ Reduced technical staff
_____ Reduced graduate student staff
_____ Reduced hourly staff
_____ Reduced publication budget
_____ Reduced equipment budget
_____ Reduced collection maintenance budget
_____ Reduced supplies and miscellaneous budget
_____ Charged service fees
_____ Other (PLEASE SPECIFY):
_____
_____

15. Estimate the percentages of your collection maintenance budget derived from:

(a) Federal government _____ %
(b) State government _____ %
(c) County government _____ %
(d) Municipal government _____ %
(e) Private donations _____ %
(f) Endowments _____ %
(g) Foundations _____ %
(h) Service fees _____ %
(i) Other sources _____ %

*16. In the last five years, have any of your personnel or your collection received grant support for: (CHECK ALL THAT APPLY)

Support For	Source of Grant
General operating support:	
_____ Personnel	_____
_____ Other _____	_____
Specialized support:	
_____ Compactors and other storage equipment	_____
_____ Computerization	_____
_____ Emergency or special assistance	_____
_____ Establishment or development of resource facility	_____
_____ Reconstruction or renovation	_____
_____ Relocation or consolidation	_____
_____ Special equipment	_____
_____ Updating or revising specimen data	_____
_____ Other _____	_____
_____	_____
_____	_____

*17. If individual research grants were awarded to individuals associated with your collection, were funds from those grants directly budgeted for collection support (i.e., purchase of storage cases, jars, etc.)

_____ Yes _____ No

*18. If yes, what was the source of the grant: _____
_____
_____

*19. In the past five years, has any proposal for collection support been denied?

_____ Yes _____ No

*20. If denied, by what agencies and when:

Agencies	When
_____	_____
_____	_____
_____	_____

21. What resources are most urgently needed for optimal use of your collection? Rank in order of priority.

Category	Priority	Estimated Additional Cost Per Year
Personnel		
Curatorial	_____	$_____
Technical	_____	$_____
Clerical	_____	$_____
Post-doctoral	_____	$_____
Graduate student	_____	$_____
Undergraduate student	_____	$_____
Hourly personnel	_____	$_____
Supplies	_____	$_____
Equipment	_____	$_____
Storage space	_____	$_____
Visitor facilities	_____	$_____
Others (PLEASE SPECIFY):		
_____	_____	$_____
_____	_____	$_____

COLLECTIONS

*22. How many visitors used your collection in 1980? _____. If possible, break this number down according to the following categories:

	Number
(a) Visiting researchers	_____
(b) Commercially-oriented users	_____
(c) Government agency users	_____
(d) Graduate students	_____
(e) Undergraduate students	_____
(f) Lay persons	_____
(g) Others (PLEASE SPECIFY):	
_____	_____
_____	_____

APPENDIX I-A

23. Check the equipment your institution (university, museum, institute, etc.) maintains for researchers. Do researchers associated with <u>your</u> collection have access to any of the equipment? Is it available for use by extramural researchers? Is there a fee charged for extramural use of the equipment? (PLEASE CHECK ALL THAT APPLY)

Equipment	Have Equipment	Available to Staff Researchers	Available to Others	Fee Charged
Biochemical laboratory (DNA/RNA)	___	___	___	___
Electronic data processing equipment	___	___	___	___
Electrophoretic equipment	___	___	___	___
Gas chromatograph	___	___	___	___
Histological preparation facilities	___	___	___	___
Mass spectrometer	___	___	___	___
Motion analysis equipment	___	___	___	___
Photographic laboratory	___	___	___	___
Radiometric dating facilities	___	___	___	___
Scanning electron microscope	___	___	___	___
Sound analysis equipment	___	___	___	___
Sound recording equipment	___	___	___	___
Spectrophotometer	___	___	___	___
Transmission electron microscope	___	___	___	___
X-ray equipment	___	___	___	___
Others (PLEASE SPECIFY):				
_____	___	___	___	___
_____	___	___	___	___

*24. If specimen loans are made, how many were processed in 1980 _____, representing how many specimens _____?

25. Are <u>any</u> of your specimen-related data computerized? _____ Yes _____ No

26. If yes, what percentage of the data is computerized? _____%

27. Do you currently provide any of the following services to individuals or organizations outside of your facility? Do you charge a fee for such services? (PLEASE CHECK ONLY THOSE WHICH APPLY TO YOUR SPECIFIC COLLECTION)

	Services	Fee Charged?	
____	Computer data storage, management, and retrieval of specimen-related information	____Yes	____No
____	Facilities made available to visiting researchers	____Yes	____No
____	Identification services	____Yes	____No
____	Isolation of pure cultures	____Yes	____No
____	Loan of general specimens	____Yes	____No
____	Loan of type specimens	____Yes	____No
____	Maintenance of genetic stock cultures	____Yes	____No
____	Preparation and conservation of specimens	____Yes	____No
____	Provision of general information on specimens	____Yes	____No
____	Storage or repository services	____Yes	____No
____	Training services in collection management	____Yes	____No
____	Use of specimens at institution	____Yes	____No
____	Others (PLEASE SPECIFY):		
	_____	____Yes	____No
	_____	____Yes	____No
	_____	____Yes	____No

28. Does your institution (university, museum, institute, etc.) maintain a centralized library pertinent to your collection? ____Yes ____No

*29. Is there a research library associated with your collection that is distinct from the centralized institutional library? ____Yes ____No

*30. If yes, how many volumes and reprints does your collection library contain? ____

APPENDIX I-A

31. Indicate the types or diversity of the materials maintained in your collection library: (CHECK ALL THAT APPLY)

		Prior-1800	1801-1900	1901-present
____	Books	_____	_____	_____
____	Manuscripts	_____	_____	_____
____	Maps	_____	_____	_____
____	Illustrations	_____	_____	_____
____	Reprints	_____	_____	_____
____	Periodicals	_____	_____	_____
____	Others (PLEASE SPECIFY):			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

32. Which of the following <u>supplemental</u> collections are maintained in conjunction with the <u>primary</u> collection? (CHECK ALL THAT APPLY).

____35mm slides	____Frozen tissues	____Recordings
____Audiospectrographs	____Histological preps	____Specimens in alcohol
____Chromosome squashes	____Original field notes	____Cleared and stained skeletal material
____Drawings	____Photographic prints	
____Dry skeletal material	____Radiographs	____X-rays
____Motion pictures		
____Others (PLEASE SPECIFY):		
_____		
_____		

33. Items your institution publishes: (CHECK ALL THAT APPLY)

____ Monographs	____ Non-technical and popular articles or books
____ Irregular papers	____ Others (PLEASE SPECIFY):
____ Technical periodicals	_____
____ Type catalogs	_____

*34. How do you catalog the specimens in your collection? (CHECK ALL THAT APPLY)

_____ Numerically
_____ Taxonomically
_____ Geographically
_____ Others (PLEASE SPECIFY):
_____
_____
_____

*35. In what units are the specimens in your collection catalogued? (CHECK ALL THAT APPLY)

_____ By individual specimen
_____ In species or locality lots
_____ By specimen sheets
_____ Others (PLEASE SPECIFY):
_____
_____
_____ By smears
_____ By slides
_____ In cultures

*36. What is the total number of units, as cited in Question 35, added to your collection over the last five years? _____

*37. In calendar-year 1980, how many specimens in the units cited in Question 35 were added to your collection by:

Exchange _____
Purchase _____
Gifts _____
Unsupported professional research _____
Grant supported research _____
Undergraduate research _____
Others (PLEASE SPECIFY)
_____ _____
_____ _____

*38. Size of your collection:

Total number of catalogued units (specimens, lots, smears, etc.) _____
Estimated number of uncatalogued units (specimens, lots, smears, etc.) _____

APPENDIX I-A

*39. Number of:

	Species	Subspecies
Holotypes:	_____	_____
Isotypes:	_____	_____
Lectotypes:	_____	_____
Neotypes:	_____	_____
Syntypes:	_____	_____
Paralectotypes:	_____	_____
Paratypes:	_____	_____

PLEASE BE CERTAIN TO COMPLETE QUESTION 40, ON THE ATTACHED FOLDOUT PAGE TO THE RIGHT.

APPENDIX I-B

QUESTIONNAIRE USED IN DEMOGRAPHIC SURVEY OF INDIVIDUAL SYSTEMATISTS

[redacted] = Question not used in analysis.

Important: BEFORE COMPLETING THE SURVEY, PLEASE READ THE COVER LETTER CAREFULLY

OMB NUMBER 3145-0069
Expiration date: 7/31/83

DEMOGRAPHIC SURVEY OF THE SYSTEMATIC BIOLOGY COMMUNITY

Information provided will be treated *in the strictest confidence*. For all questions, provide exact information, if possible. Please approximate when exact information is not available. If you have any questions about this survey, please contact:

Project Coordinator
Association of Systematics Collections
Museum of Natural History
University of Kansas
Lawrence, KS 66045
913-864-4867

EDUCATION:

1. **Please indicate your educational background below:**

Highest Degree	Name of Institution	State (if U.S.A.) or Foreign Country	Year Received or Granted
1.01 Pre-College	XXXXXXXXXXX		
1.02 B.A./B.S.			
1.03 M.A./M.S.			
1.04 Ph.D.			
1.05 Other Degrees: (L.L.D.,M.D.,etc.)			

2. **Specify in what field you received your:**
   2.01 B.A./B.S. _____
   2.02 M.A./M.S. _____
   2.03 Ph.D. _____
   2.04 Other Degrees (Please Specify): _____

3. **Please indicate the type of school that awarded your degree/s. (There should be one check mark for each degree you received.)**

	B.A./B.S.	M.A./M.S.	Ph.D.	Other Degrees (Specify)
3.01 state supported school				
3.02 private school				
3.03 city supported school				
3.04 federally supported school (i.e. West Point)				

4. **Please give the name of your major professor (adviser) for your highest degree earned:**

   Name of Major Professor for Each Degree
   4.01 M.A./M.S. _____
   4.02 Ph.D. _____
   4.03 Other Degrees _____

5. **Methodological courses taken: (Please check all that apply.)**

   5.01 ☐ basic statistical techniques
   5.02 ☐ foreign language
   5.03 ☐ technical writing
   5.04 ☐ computer programming
   5.05 ☐ photography
   5.06 ☐ public speaking
   5.07 ☐ cost-benefit analysis
   5.08 ☐ calorimetry
   5.09 ☐ radioisotope technique
   5.10 ☐ game theory
   5.11 ☐ tissue culture
   5.12 ☐ information retrieval
   5.13 ☐ multivariate statistical analysis
   5.14 ☐ problem solving/decision making techniques
   5.15 ☐ cartography
   5.16 ☐ electrophoresis
   5.17 ☐ gas chromatography
   5.18 ☐ remote sensing
   5.19 ☐ telemetry
   5.20 ☐ mineral analysis
   5.21 ☐ scientific illustration technique
   5.22 ☐ electron microscopy (TEM or SEM)
   5.23 ☐ data base management
   5.24 ☐ matrix algebra
   5.25 ☐ Other (Please Specify):
   _____
   _____
   _____

6. **Have you received formal training in systematic biology?**
   6.01 ☐ Yes ☐ No

   If yes, through:
   6.011 classroom instruction ☐ Yes ☐ No
   6.012 seminars ☐ Yes ☐ No

7. **Were you required to participate in a special field course in order to receive your highest degree?**
   ☐ Yes ☐ No

8. **In what type of field activities did you participate during your graduate career?**
   8.01 ☐ Organization for Tropical Studies Curriculum
   8.02 ☐ Marine Station
   8.03 ☐ Terrestrial Field Station
   8.04 ☐ Aquatic Field Station
   8.05 ☐ Research Vessel
   8.06 ☐ Museum or University Sponsored Summer Field Course
   8.07 ☐ Expedition (College Credit) Course
   8.08 ☐ Expedition (Non-College Credit) to Foreign Country
   8.09 ☐ Expedition (Non-College Credit) Inside U.S.
   8.10 ☐ Other (Please Specify) _____
   _____

9. **Did you travel (in the field and/or to other museums) in conjunction with research for your highest degree? What degree were you working toward at time of your travel?**

				Degree(s)
9.01	☐ Yes	☐ No	Field Work In Foreign Country	
9.02	☐ Yes	☐ No	Field Work In U.S.	
9.03	☐ Yes	☐ No	Museum(s) In Foreign Country	
9.04	☐ Yes	☐ No	Museum(s) In U.S.	

10. **Please list the languages (foreign or computer) or other research skills that were used to satisfy language requirements for your highest degree.**
    10.01 _____
    10.02 _____
    10.03 _____

11. **How was your graduate career financed?**

	M.A.	Ph.D.
11.01 Teaching Assistantship	☐	☐
11.02 Assistant Instructorship	☐	☐
11.03 Institutional Supported Research Assistantship	☐	☐
11.04 Grant Supported Research Assistantship	☐	☐
11.05 Curatorial Assistantship	☐	☐
11.06 Scholarship	☐	☐
11.07 Other (Please Specify) _____	☐	☐

12. **Would you have been able to finish your graduate studies if you had not had the financial support cited above?** ☐ Yes ☐ No

CAREER:

The questions which follow are applicable to both post-graduate professionals and graduate students. Please answer *all* questions. Your answers will be analyzed according to your response to Question 13.

13. **Present work status is: (Please Check One).**
- 13.01 ☐ Established professional
- 13.02 ☐ Post doctoral
- 13.03 ☐ Doctoral student
- 13.04 ☐ Master's student

14. **What type of institution do you work for:**
- 14.01 ☐ Museum
- 14.02 ☐ Four Year College/University
- 14.03 ☐ Two Year College
- 14.04 ☐ Laboratory
- 14.05 ☐ Private Industry
- 14.06 ☐ Federal Government Agency
- 14.07 ☐ State Government Agency
- 14.08 ☐ Other (Please Specify): _____

15. **Present position title:** _____

16. **Is your employment contract based on:**
- 16.01 ☐ 9 months
- 16.02 ☐ 12 months
- 16.03 ☐ _____months (provide number of months)

17. **What is your salary range (including dollar equivalent perquisites)?**
(Choose only one answer)
- 17.01 ☐ $ 0 - 10,000
- 17.02 ☐ $10,001 - 15,000
- 17.03 ☐ $15,001 - 20,000
- 17.04 ☐ $20,001 - 25,000
- 17.05 ☐ $25,001 - 30,000
- 17.06 ☐ $30,001 - 35,000
- 17.07 ☐ $35,001 - 40,000
- 17.08 ☐ $40,001 - 50,000
- 17.09 ☐ $50,001 - above

18. **Please indicate the average number of hours per seven day week you actually allocate for:**
- 18.01 _____Research
- 18.02 _____Teaching
- 18.03 _____Extension Services (answering questions for the public)
- 18.04 _____Curatorial Activities
- 18.05 _____Professional Services/Committees
- 18.06 _____Administration
- 18.07 _____Advising Students
- 18.08 _____Other (Please list what the other activities are):

_____

_____

19. **Indicate what taxonomic discipline of systematic biology you work on (i.e., herpetology, mammalogy, ornithology, entomology), what taxonomic group (to the lowest taxonomic level possible) and the geographic area emphasized in your research. Please be as specific as possible.**
- 19.01 Discipline _____
- 19.02 Taxonomic Group:
  - 19.021 Order _____
  - 19.022 Family _____
  - 19.023 Genus _____
  - 19.024 Approximate Number of Species in this Group _____
- 19.03 Geographic Emphasis _____

20. **How do you finance your research?**
- 20.02 ☐ Grants
  - 20.011 ☐ Federal
  - 20.012 ☐ State
  - 20.013 ☐ Institutional
- 20.02 ☐ Contracts
  - 20.021 ☐ Federal
  - 20.022 ☐ State
  - 20.023 ☐ Institutional
- 20.03 ☐ Personal Income
- 20.04 ☐ Responsibility of Present Employment
- 20.05 ☐ Other (Please Specify) _____

21. **Please number in order of priority, the areas you would like to see supported by the Systematic Biology Program (e.g., 1 = highest priority, 2 = second highest priority).**
- 21.01 _____Floral or Faunal Surveys (Inventories)
- 21.02 _____Organismic Characterizations*
- 21.03 _____Revisions or Monographic Studies
- 21.04 _____Theoretical (Non-Taxon Dependent) Studies
- 21.05 _____Workshops/Symposia
- 21.06 _____Collaborative research with separate awards to different Principal Investigators.
- 21.07 _____Interdisciplinary research with a number of Principal Investigators from different disciplines, contributing to a single program; single award.
- 21.08 _____Equipment for Research
- 21.09 _____Pre-Doctoral Research Programs
- 21.10 _____Post-Doctoral Research Programs
- 21.11 _____Tropical Studies
- 21.12 _____Undergraduate Research
- 21.13 _____Other (Please Specify):

_____

_____

_____

*Characterization: Studies in which a variety of kinds of information (molecular, cytological, environmental, genetic, morphological, etc.) will be recorded without an immediate intent to revise the taxonomic relationships of a species complex or higher taxonomic grouping.

22. **Please number, in order of priority, the type of facility you would like to see supported by the Biological Research Resources Program (e.g., 1 = highest priority, 2 = second highest priority).**
- 22.01 _____National/International Resource Centers
- 22.02 _____Regional/Topical Resource Centers
- 22.03 _____Local/Parochial Resource Centers
- 22.04 _____Other _____

_____

23. **Please number, in order of priority, the areas you would like to see supported by the Biological Research Resources Program (e.g., 1 = highest priority, 2 = second highest priority). Rank each subdivision (23.01 - 23.04) and then within each subdivision rank which items you feel should be funded first, second, etc.**
- 23.01 _____General Operating Support for Collections
  - 23.011 _____Relocation and/or Consolidation of Collections
  - 23.012 _____Collection Management Personnel
  - 23.013 _____Reorganization of Collections
  - 23.014 _____Renovation/Construction
  - 23.015 _____Emergency/Special Assistance
  - 23.016 _____Up-Dating/Revising Specimen Data
  - 23.017 _____Computerizing Specimen Data
  - 23.018 _____Other _____
- 23.02 _____Equipment
  - 23.021 _____Storage Cases, Compactors
  - 23.022 _____Computer Hardware/Software
  - 23.023 _____Multi-user Research Equipment (e.g., scanning electron microscopes)
  - 23.024 _____Other _____
- 23.03 _____Publications
  - 23.031 _____Monographs
  - 23.032 _____Other _____
- 23.04 _____Other: (Please Specify)
  - 23.041 _____
  - 23.042 _____

24. **Have you attempted to obtain permits to work on "Endangered" or "Threatened" species?**
☐ Yes ☐ No

25. **Were you able to obtain the necessary permits?**
☐ Yes ☐ No

26. **List the *three* most important professional societies or organizations to which you belong.**
- 26.01 _____
- 26.02 _____
- 26.03 _____

27. **Have you published in the periodicals sponsored by the professional societies or organizations you belong to?**
☐ Yes ☐ No

28. **In what year did you start publishing articles?** _____

29. **How many peer-reviewed articles have you published in the last 5 years?** _____

30. **How many books have you published?** _____

31. **Please indicate your career goals by placing an "x" in the appropriate column(s)/row(s).**

Type of Work	College or University	Museum	Commercial	Government Agency
31.01 Research				
31.02 Administration/ Management				
31.03 Public Communications				
31.04 Teaching			XXXXX	XXXXX
31.05 Curating				
31.06 Other				

32. **If you checked "research" as a goal in Question 31, is your interest in pure research ☐, applied research ☐, or both ☐ ?**

33. **Does the institution in which you are working maintain systematics collections in your field?** ☐ Yes ☐ No

34. **Do you have to rely on collections in other institutions to do the majority of your research?** ☐ Yes ☐ No

35. **Do you have a personal research collection?**
☐ Yes ☐ No
35.02 If yes, in what discipline(s) (e.g., herpetology, entomology, mammalogy, etc.)?
_____

36. **Is your present position consistent with your career goals?** ☐ Yes ☐ No

37. **Is your present position dependent upon the graduate training you received?** ☐ Yes ☐ No

38. **If applicable, how long have you been employed outside your chosen field (current position only)?**
38.01 _____Years 38.02 _____Months

39. **How many positions have you held since receiving your highest degree?** _____

40. **Please list the positions (by title), beginning with the first held after receiving your highest degree.**

	Title of Position	State	Institution	Year Job Started and Ended
40.01				
40.02				
40.03				
40.04				
40.05				

41. **Are you a tenured faculty member?** ☐ Yes ☐ No

42. **If applicable, how many graduate students do you have?**
42.01 Masters students _____1980-1981 _____1981-1982
42.02 Ph.D. students _____1980-1981 _____1981-1982

43. **Please indicate your formal allocation of time to the following activities (cite as percentages of a forty hour work week).**
43.01 _____Teaching 43.05 _____Administration
43.02 _____Research 43.06 _____Extension
43.03 _____Curation 43.07 _____Advising Students
43.04 _____Professional Service
43.08 _____Other_____

44. **Do you hold an endowed chair?** ☐ Yes ☐ No

45. **Are you working in the same broad taxonomic discipline (e.g., herpetology, mammalogy, botany, entomology) in which you received your highest degree?**
☐ Yes ☐ No

46. **Are you still working on the same taxonomic group you studied in conjunction with your highest degree?**
☐ Yes ☐ No

47. **If you are *not* working on the same taxonomic group(s), please indicate the discipline, taxonomic group, and geographic area(s) currently emphasized in your research.**
47.01 Discipline _____
47.02 Taxonomic Group:
47.021 Order _____
47.022 Family _____
47.023 Genus _____
47.024 Approximate Number of Taxa in this Group _____
47.03 Geographic Emphasis _____

48. **Which group (or school) of systematics do you identify with?**
48.01 ☐ evolutionary systematics
48.02 ☐ phenetics
48.03 ☐ phylogenetics/cladistics
48.04 ☐ eclectic
48.05 ☐ none

49. **Have you received a grant/contract in the last five years?** ☐ Yes ☐ No.
If yes please list the information below:

Year	Duration of Grant (in months)	Amount of Award	Funding Source
49.01			
49.02			
49.03			
49.04			
49.05			

50. **How have you kept up with advances in your field since receiving your highest degree?**
50.01 ☐ Workshops or short courses
50.02 ☐ Field work
50.03 ☐ Reading of scholarly journals
50.04 ☐ Sabbatical
50.05 ☐ Annual meetings of scholarly societies
50.06 ☐ Personal interaction with peers
50.07 ☐ Scheduled courses
50.08 ☐ Other (Please Specify)_____
_____

51. **What is the thrust of your systematic research?**
51.01 ☐ Intraspecific relationships
51.02 ☐ Interspecific relationships
51.03 ☐ Intergeneric relationships
51.04 ☐ Interfamilial relationships
51.05 ☐ Interordinal relationships
51.06 ☐ Other (Please Specify): _____

52. **How many workshops, conferences or society meetings did you attend in:**

	1980	1981
52.01 Workshops		
52.02 Conferences		
52.03 Society Meetings		

PERSONAL:

The personal data requested below will be used to compare the systematic biology community with other academic fields and to create a demographic profile of the systematic biology community. All information in this section of the questionnaire will be analyzed as grouped data so that the confidentiality of each individual's answers will be preserved.

53. **Date of Birth**_____

54. **Place of Birth (Country and State, or Equivalent):**

_____

55. **Race: (Please Check One).**

55.01 ☐ Caucasoid
55.02 ☐ Negroid
55.03 ☐ Mongoloid
55.04 ☐ American Indian
55.05 ☐ Australoid
55.06 ☐ Other _____

56. **Sex:** ☐ **Male** ☐ **Female**

57. **Are you a U.S. Citizen?**

57.01 ☐ Yes ☐ No
57.02 Naturalized? ☐ Yes ☐ No

58. **If you are not a U.S. citizen what is the country of your origin?** _____

59. **Father's Principle Occupation:**_____

60. **Father's Highest Degree Earned:** _____

61. **Mother's Principle Occupation:**_____

62. **Mother's Highest Degree Earned:**_____

63. **Birth Order of Respondent:**

63.01 ☐ First Child Born
63.02 ☐ Second Child Born
63.03 ☐ Third Child Born
63.04 ☐ Fourth Child Born
63.05 ☐ Fifth Child Born
63.06 ☐ Sixth Child Born
63.07 ☐ Other: _____

64. **Number of Full Siblings (Total)**_____

64.01 _____ Sisters
64.02 _____ Brothers

65. **Current Marital Status:** ☐ **Married** ☐ **Unmarried**

66. **What was your motivation for entering the field of systematic biology?**

66.01 ☐ Hobby
66.02 ☐ Key Personality Influenced You
66.03 ☐ Key Courses Influenced You
66.04 ☐ Independent Undergraduate Research Experience
66.05 ☐ Career Opportunities
66.06 ☐ Other (Please Specify)_____

We are considering publishing a directory of systematic biologists. If you would like to be included in the directory, please provide the following information. (Please *print* or *type*).

THE PERMISSION GIVEN PERTAINS EXCLUSIVELY TO THE INFORMATION YOU PROVIDE BELOW. IT DOES *NOT* PERTAIN TO QUESTIONS 1 THROUGH 66.

I hereby give permission in accordance with the Privacy Act (P.L. 93579) for my responses to the following questions to be used in a Directory of Systematists.

Signature: _____ **Date:**_____

Name _____

Professional Address _____

_____

_____

Highest Degree _____

Please indicate the discipline, taxonomic group, and geographic area(s) currently emphasized in your research:

Taxonomic Specialization:

Order _____

Family _____

Genus _____

Geographic Emphasis _____

Would you identify specimens in your area of expertise?

Yes ☐ No ☐

If yes, would you charge a fee for such identifications?

Yes ☐ No ☐

Would you be available for consultation in your field of specialization if asked? Yes ☐ No ☐

Research Interest (In 15 words or less):

THE SYSTEMATICS COMMUNITY
REPORT TO THE NATIONAL SCIENCE FOUNDATION

APPENDIX II

SELECTED REFERENCES

APPENDIX II

SELECTED REFERENCES

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THE SYSTEMATICS COMMUNITY
REPORT TO THE NATIONAL SCIENCE FOUNDATION

APPENDIX III

SOURCES OF FEDERAL FUNDING FOR BIOLOGICAL RESEARCH

Compiled and Edited

by

Peter C. Escherich

and

Roger E. McManus

SOURCES OF FEDERAL FUNDING FOR BIOLOGICAL RESEARCH

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